TECHNOLOGY DEPARTMENT

The CHEMICAL AGE

VOL LVIII 19 JUNE 1948 No 1510

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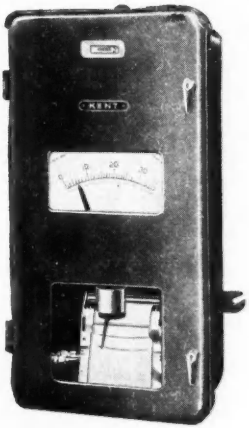

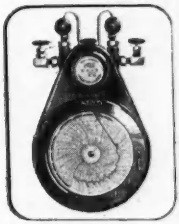

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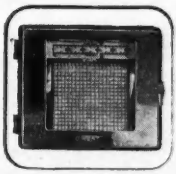

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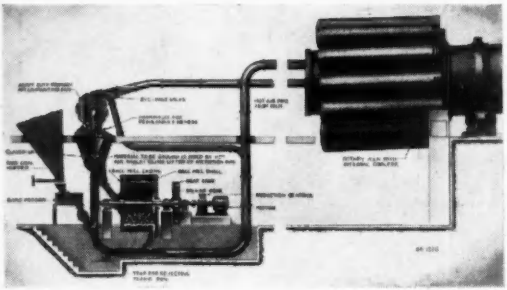

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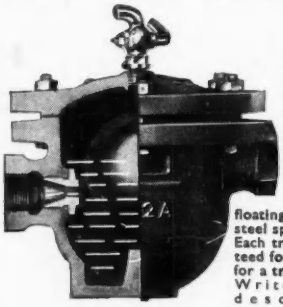

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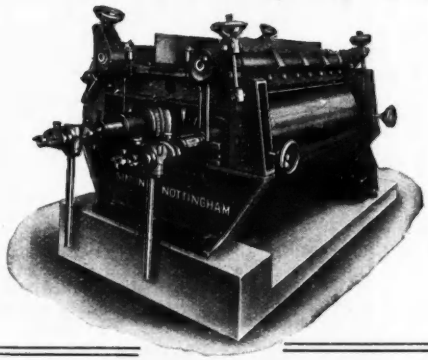

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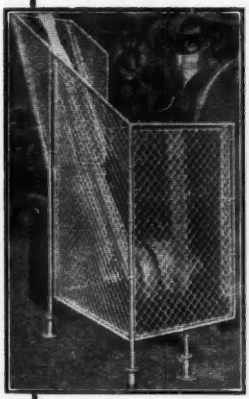

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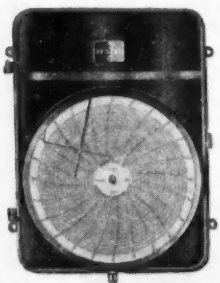

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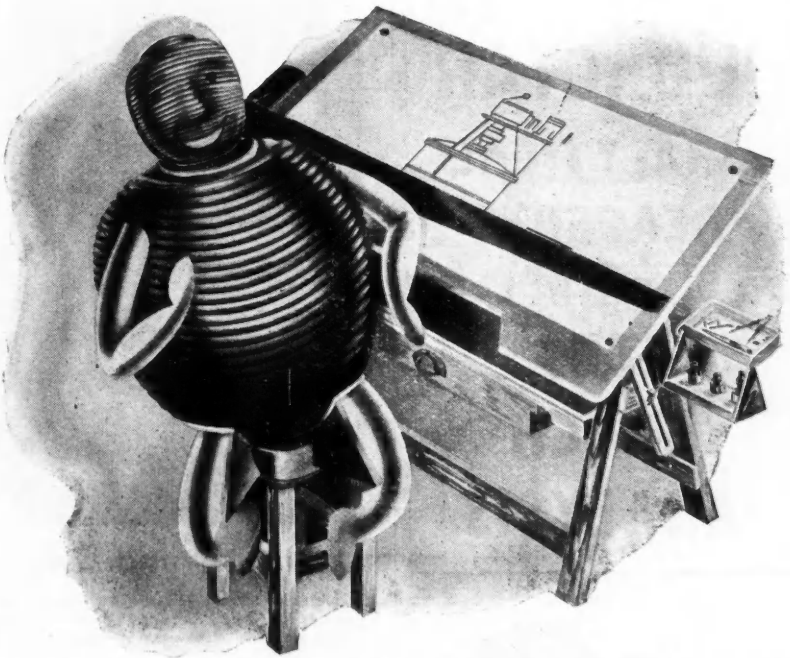

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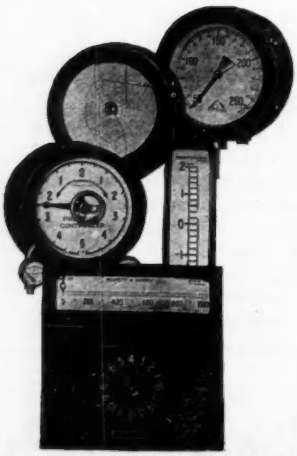

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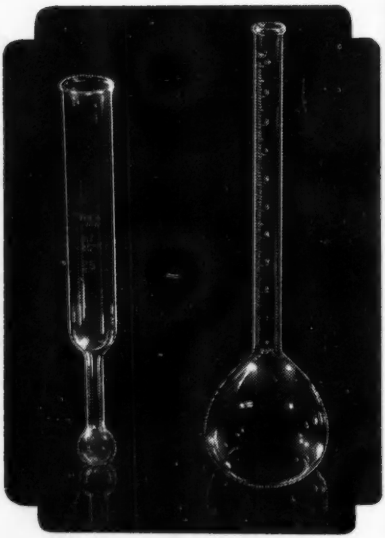

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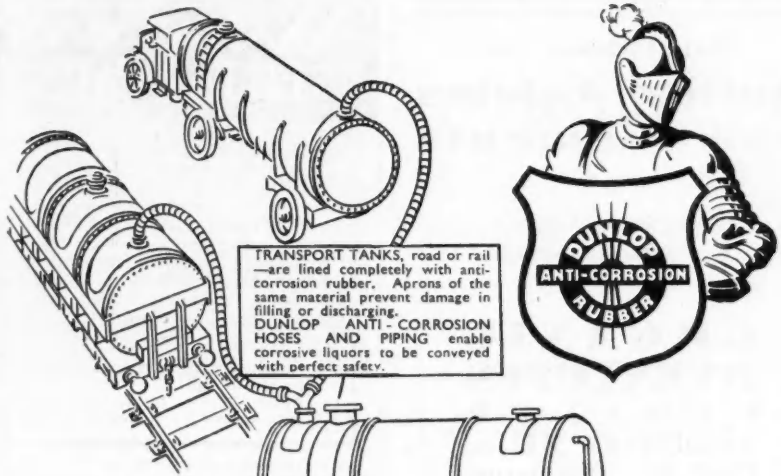

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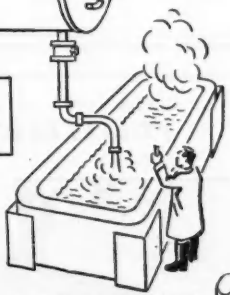

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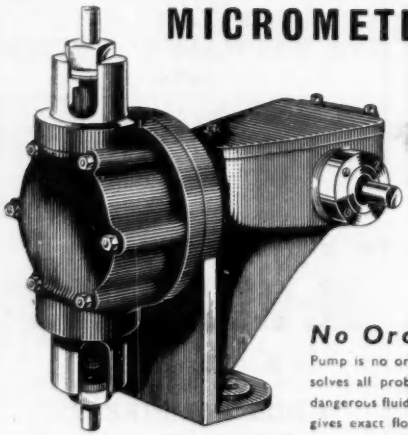

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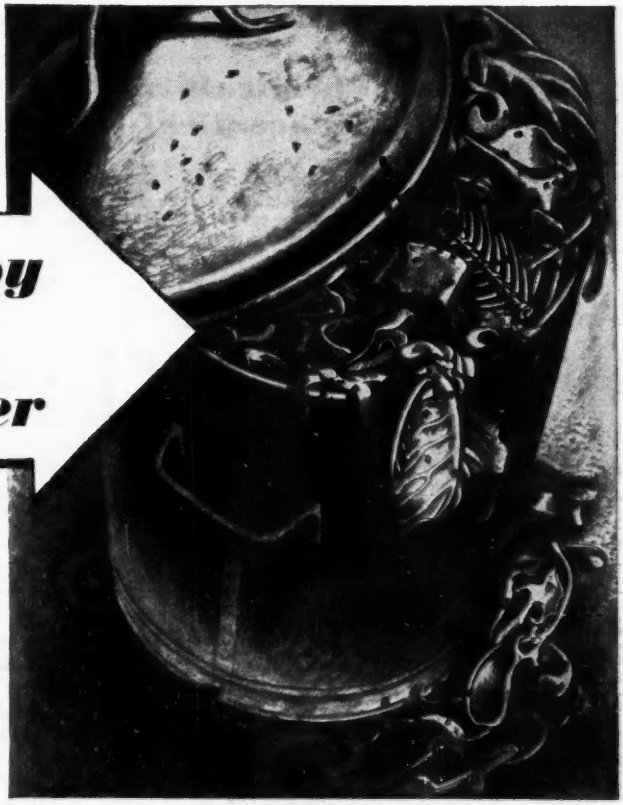

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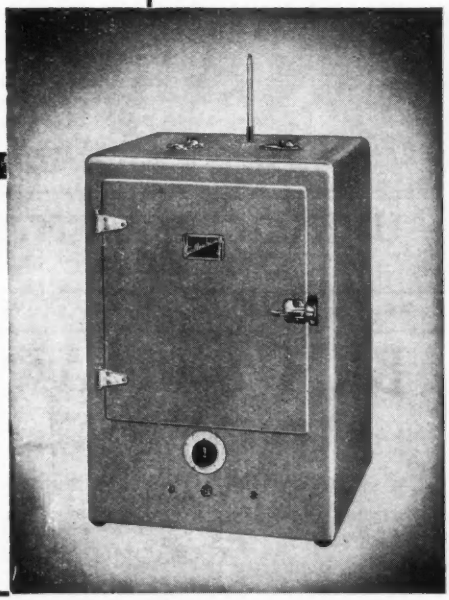

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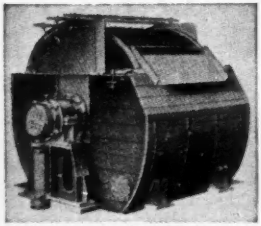

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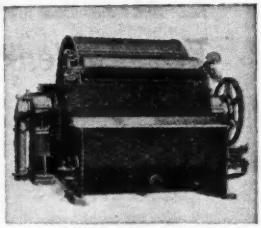

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VOL. LVIII
No. 1510.

19 June 1948

Annual Subscription, 26s.
8d. per copy; post free, 10d.

Guarding the Gate

NEARLY all who practise a profession are members of one or more professional bodies. These bodies vary to some extent in their functions, some like the Society of Chemical Industry and the Chemical Society are primarily concerned to secure the fullest discussion of new discoveries or to review the current body of information in existing industries or branches of philosophy. Others, such as the Royal Institute of Chemistry, the Institute of Physics, the Institute of Fuel, the Institution of Gas Engineers, combine this function with that of acting as a qualifying body to ensure that everyone accepted into the profession is qualified to practise it. These bodies do not in any way exercise the functions of trade unions. That has long been apparent. They are wholly professional in character.

The question now arises, and becomes increasingly difficult to evade, of what is likely to be their function in an increasingly socialistic world. The urge to nationalise everything, if nationalised industries should prove successful, will not stop short at fuels, or satisfy itself with a diet of iron and steel. Progressively the principle would certainly be extended; this appetite grows by what it feeds on.

What, then, are to be the functions of professional institutions, should a new economy be established in which the freedom of the executive or scientist would certainly be diminished? The answer to this question was given by our new Ambassador to the United States, Sir Oliver Franks, speaking to the Iron and Steel Institute recently. The Institute exists chiefly to publish technical papers, to encourage discussion of new ideas, to form groups for the discussion of technical subjects and to provide for the full and free discussion of technical problems of the industry. It is more than ever necessary that there should be bodies of that character in a socialistic, nationalised society.

Experience has shown that all nationalised industries tend to be centripetal. Decisions are taken by individuals or groups at what is euphemistically known as "high level," and against the dictates of these modern Medes and Persians there is no appeal. If, as may happen so frequently, there are reasons entirely outside technology why some new idea is not approved, the approach to an important industrial advance or its achievement may be lost. What is worse, the idea will be taken to our competitors. It may be that the "high level" authority is unwilling to take a risk; he or they may have just taken a risk that turned out badly and caution is then preferred to boldness; the authority may not have understood the implications of the proposals. Such things happen even in the best regulated of nationalised activities—the Fighting Services, for example. We have in mind the well-authenticated story of what happened to the persistent attempts by Murex, Ltd., to oblige the War Office, a year or two before the war, to recognise the very significant results of their private tests of the penetrating power of bullets incorporating tungsten carbide. The theory was rebuffed, until the bitter lesson imparted by the

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German Panzer divisions in the early stages of the North African campaign forced its acceptance. These things do happen.

It is therefore of the highest importance that there shall be professional bodies able and willing to stage discussions, possibly in defiance of authority, in order that essential technical and scientific knowledge shall not be stillborn or smothered at birth. These institutions, as Sir Oliver Franks put it, must "take hold where in the universities they leave off with their fundamental ideas and carry on a research not less rigid in its standards, not less objective, conforming equally to the canons of scientific method," in order to apply knowledge to practical ends. The rôle of the professional body, in short, is the pursuit of truth.

The functions of such a body are not only those of discussion. Education of the younger element so that there will be sufficient trained men to follow must always be an important part of the work. These professional bodies have, in Sir Oliver's view, a most important part to play in our present and future rehabilitation. The swell of the disturbances of war will not quickly cease: "It is unreasonable to think that this country will be sailing away on a flat ocean of prosperity next week, or next month, or next year. But it is reasonable to think that if we use our brains, if we use our technical institutions, if we find out fresh knowledge and how to apply it, how to develop the plant, how to refine the products, how to arrive at a better quality and price, and pass them on to our consumers, we shall complete our adjustment in triumph, and the industries of this country will make us once more secure and prosperous in the near years to come. All this is part of what a technical institute is for. It is to find out the truth about its subject matter, to practise its members in the free pursuit of objective truth with disciplined minds, and to improve the efficiency of the industry with which it is connected so that it can play its full part in the reconstruction of the country and its industry."

The technical and professional institutions have thus a most important part to play in the life of the country and this rôle will probably be increasingly important in proportion as the industries of the country become nationalised. Technical institutions can live only in an atmosphere where the free interchange of ideas and opinion is possible. Whatever may come out of this fashion in our age for centralised control, it seems destined to force upon technical and professional bodies a greatly heightened responsibility to see that restrictions are never placed on the free expression of scientific thought.

Soviet Restricts German Chemical Trade.—As a result of the various Russian regulations governing the movement of rail freight from Berlin to the western zones, chemical manufacturers in the British sector of the city are experiencing great difficulty in disposing of a large part of their output, states *The Times* correspondent in Berlin.

NOTES AND COMMENTS

Experts—and Others

IN London last week two bodies conspicuously dissimilar in outlook were immersed in studying the same conjectural matter: the fate of the gas industry and its many vital auxiliaries now that they are to come under State direction. The Institution of Gas Engineers, holding its 85th annual meeting, had the profound advantage of being able to view the great industry in a perspective embracing much of its early history, which members had themselves helped to shape, and its logical course of development, in guiding which their services will be essential. The House of Commons Committee, debating how the multifarious gas industry can be compressed into a more "socialised" shape, most evidently lacked much of the enlightenment which the engineers are so well qualified to provide. The moral is obvious, and even some of the sponsors of the Gas Bill must by now have recognised its force.

Gas Chemicals

NOTHING indicates more clearly the relative qualifications of the two groups to determine what is best for the gas industry than the contrast between the informed study given at the gas engineers' meeting of the widening prospects for the gas industry's vital chemical by-products and the perfunctory treatment it received in the House. In the view of some gas engineers, the recovery of chemicals, such as sulphur, tar, ammonia, naphthalene, and benzol, is capable of exercising a decisive influence in the economy of the gas production, and there is no doubt that chemical traders are ready to provide remunerative outlets for these and other products. In the House, consideration of this subject was left almost until the last, when Mr. P. Roberts and Mr. Brendan Bracken intervened "to make certain that the Minister realised the importance of this chemical industry." The assurance by Mr. A. Robens (Parliamentary Secretary of the Ministry of Fuel) "that the Government was anxious that the utmost use should be made of these by-products . . .and that the importance of their development is fully recognised" carried no conviction that this very profitable aid to several industries will be enabled to fulfil the abundant promise foreseen by those best qualified to judge.

Automatic Control

POTENTIALLY one of the most promising of the newer activities of the Ministry of Supply is its readiness to collaborate with others to make readily available the technology of some subjects which now have a very intimate bearing on progress in industry. The newest evidence of this is the news that the Ministry's Interdepartmental Technical Commttee is being supported by the Ministry of Education and the Scottish Home Office in initiating a series of courses throughout the summer on the subject of automatic control, in which many industries—and notably chemical industry—may find the means of effecting vitally import economies in some specialised departments, but have seldom had sufficient trained staff to justify the transition to new methods. The installation of servo mechanism and the capacity to decide when such conversion will repay the very substantial cost are patently not among the qualifications likely to be acquired in a course of lectures; but for those required to operate and maintain chemical production by remote control the information now being made available should prove an excellent starting point. The institution of these courses reflects a practical and timely recognition of the situation and the main objective will be to equip first a body of technical teachers able to pass on the essential information concerned with such things as voltage regulators, speed governors and temperature regulators. The Ministry is spreading its net wide, dismissing the theory that an unusually high standard of theoretical knowledge is required of all who aspire to handle automatic controls. "Naturally," it says, "the more advanced aspects of the subject can be grasped only by those expert in mathematics and engineering, but the simpler forms, such as a thermostatically controlled heating system, can be understood by anyone with a rudimentary knowledge of physics. The more involved applications should be readily understood by any second- or third-year student of physics or engineering." Whatever view is taken about that, the Ministry will be applauded

for having shown initiative of a useful kind and encouraged to go on, preferably providing in future fuller facilities for the South of England than the one course in London (against four for Birmingham, Edinburgh and Newcastle).

Roman Metallurgy

NEW evidence that the ancient Romans were no mean metallurgists is afforded by a primitive padlock, corroded almost beyond recognition, which was recently despatched to the research department of Edgar Allen & Co., Ltd., for examination. Analysis was carried out by the modern, non-destructive method, which makes use of the spectrograph, and the opinion given that the padlock may well have been manufactured in Roman times. It was revealed that the main body of the lock was iron (not of meteoric origin), coated with brass, and containing a small proportion of lead. Surprisingly enough, the examination also showed the presence of small amounts of silicon, manganese, nickel, copper, zinc, and tin. If and how far some of these metals may have been accidental impurities acquired either during the original production process or later during its possible contact over a long period with other elements are matters upon which no expert is anxious to pass judgment. It is known, however, that the Romans made frequent use of lead, as well as British copper and tin—and the principle of alloying is, of course, by no means as young as we are prone to pretend.

Time and Space Problem

THE American Chemical Society, whose reputation as a contributor of information on practical problems is formidable, is setting an example of a useful sort in dealing with a difficulty common on both sides of the Atlantic—which in this country is frequently associated with the necessity of travelling long distances to Edinburgh for scientific conferences. In the U.S.A., organisers of the forthcoming national meeting of the American Chemical Society, of which this is the 114th, had to resolve a much severer problem arising out of the fact that wherever a national convention is held numbers of ACS members will have to travel 1000 or more miles to attend it. The American solution, of "staggering" the proceedings—in time as well as space—is deserving of consideration here, despite the undoubted attractions of occasional trips to Edinburgh. Each of the 17 divisions of the ACS will have headquarters in one or other of three centres, Washington, D.C. (August 30-September 3), St. Louis, Mo. (September 6-10) and Portland, Ore. (September 13-17). Some of the larger divisions will in addition hold auxiliary sessions in other cities, and, a more evident innovation, some of the papers are likely to be presented twice in different localities, by the "senior" author in one and by a "junior" author in another. The last stategem has very obvious advantages over the more common alternative of "presentation *in absentia*" in dealing with the unresolved problem of being in two places at the same time—without resort to television.

Firewood and Firewater

A POPULAR misconception of some antiquity is reported to have been demolished—by Dr. Robert S. Aries, chemical engineering professor at Brooklyn Polytechnic Institute. Good whisky, he told the American Chemical Society in Chicago last week, could be made cheaply from sawdust and oil refinery wastes, the resultant alcohol being of a quality identical with that made from grain. Completing a picture calculated to freeze the blood of some of our Northern distillers, Dr. Aries says that each year in the U.S.A. more than 10 million tons of sawdust go to waste and each ton might yield some 50 gal. of alcohol, "which consumers would be unable to distinguish from the familiar product." There would be enough to supply every conceivable demand for alcoholic drink three times over. Whether there would then continue to be a demand at all for any drink stronger than cocoa was one of the even more debatable points with which the doctor does not appear to have dealt.

Microchemists' Meeting.—The recent meeting of microchemists in Aberdeen (THE CHEMICAL AGE, May 15) was organised by the Microchemistry Group of the Society of Public Analysts and Other Analytical Chemists, and Mr. Norman Strafford, who presided, is the chairman of the group.

NEW HYDROGEN PEROXIDE PLANT

Laporte's Start Building at Warrington

THE establishment of a new industry in Warrington—the manufacture of hydrogen peroxide—was brought a stage nearer on Thursday last week when about one hundred guests including representatives of British chemical companies, the local authority, trade unions, employers' associations and transport undertakings saw Mrs. L. P. O'Brien, wife of the chairman of Laporte Chemicals, Ltd., lay the foundation stone of the company's Walton Works at Warrington. Despite heavy rain, the ceremony was completed as planned and guests were afterwards taken to Liverpool, where a reception was held at the Adelphi Hotel.

The factory, which will cost approximately £715,000 to construct, is expected to begin production early in 1950. The site covers 31 acres, and road and sewerage facilities, together with purification and neutralising plant, have already been completed. Transport arrangements include a three-spur railway siding connected with the existing track alongside the Manchester Ship Canal.

When the Warrington plant is completed the company states that it will consider whether to cease operating some of the older hydrogen peroxide plant at Luton.

Adequate Power Supplies

During the morning proceedings, the chairman of the company said that the laying of the stone marked the end of six years of intensive planning often accompanied by "frustration and irritation." In May, 1942, the company advertised nationally for suitable sites for the establishment of a new hydrogen peroxide plant and after "screening" numerous suggestions from all parts of the country it chose Warrington, where adequate water, and electricity supplies were in existence. The availability and price of coal in the district were also important factors in the setting-up of a plant of this type, Mr. O'Brien continued, especially when the British manufacturer was competing with foreign firms which possessed abundant supplies of hydro-electric power.

Supplying the Textile Trade

Most people, the chairman observed, were prone to associate hydrogen peroxide with blondes; the last war revealed there were more serious applications of this product and peace-time developments promised to open up a wide field of industrial use. That was the basis of Laporte's interest.

While they had received a certain amount of outside assistance in the planning of the new plant, the firm could safely claim that in the main the project was the result of domestic research by its own technicians.

Welcoming the new industry to Warrington, the Mayor (Councillor W. L. Challinor) speaking at the Liverpool luncheon, said that it was fitting that the manufacture of hydrogen peroxide should be introduced to the town where, over 180 years ago, Joseph Priestley conducted his early experiments connected with barium oxide.

Responding to the Mayor's welcome, Mr. O'Brien said that other considerations, in addition to historical associations, had in-

(*Continued overleaf*)

Mrs. L. P. O'Brien, wife of the chairman and managing director of Laporte Chemicals, Ltd., laying the foundation stone, watched by Mr. O'Brien (third from left) and directors and friends

Instruction in Automatic Control

Ministry of Supply Courses Begin in Edinburgh

IT has long been felt that the basic fundamentals of servo-mechanism (automatic control) have been neglected in the training of the rank and file of our engineers—says a current Press notice from the Ministry of Supply. Aware of this weakness in normal engineering syllabuses, the Interdepartmental Technical Committee on Servo-mechanism secured the co-operation of the Ministry of Education, the Scottish Home Office and various educational institutions throughout the country. As a result, courses designed to meet this apparent need, particularly in regard to training instructors, will be held during the next few months in London, Birmingham, Newcastle and Edinburgh, where the first course begins on June 18.

Widened Applications

These courses will include lectures on basic principles, general applications and applications of particular local significance. It is hoped at a later date to organise similar courses in other important centres.

The Technical Committee consists of experts drawn from the various universities, Government research establishments and large industrial organisations, the administrative work being carried out by the Ministry of Supply's Directorate of Weapon Research. The prime object of this committee is to act as a co-ordinating link between the research side of this science and its practical applications.

To date, one of the greatest obstacles to the furtherance of automatic control has been the lack of people sufficiently conversant with the subject to be able to teach it, either in elementary or post-graduate courses. Therefore the first step towards further dissemination of servo-mechanism technology is to attract sufficient technical teachers to these courses, who will be able to pass on to their students newly acquired knowledge of such devices as voltage regulators, speed governors and temperature regulators.

In the past too much emphasis has been placed upon the necessity for higher mathematics to understand the principles of automatic control. Naturally, the more advanced aspects of the subject can only be grasped by those expert in mathematics and engineering, but the simpler forms, such as a thermostatically controlled heating system can be understood by anyone with a rudimentary knowledge of physics. The more involved applications should be readily understood by any second- or third-year student in physics or engineering. The possibilities of instability in a servo system, the physical conditions which must exist for such a system to be stable, self-oscillatory, or unstable, and the methods of eliminating instability, can be explained without recourse to any mathematics higher than the standard required for the ordinary National Certificate in Electrical Engineering.

For example, any student who is familiar with rotating vectors for the graphical representation of simple harmonic quantities—such as voltage and current—can be taught to take harmonic response diagrams experimentally, to interpret them, and use them for general theoretical considerations, without ever having heard of Nyquist and without entering into the intricacies of the theory of the complex variable and contour integrals.

So far, courses scheduled for this year are: Heriot Watt College, Edinburgh, June 15-18; Central Technical College, Birmingham, July 5-9; Northampton Polytechnic, London, July 12-16; Central Technical College, Birmingham, August 30-September 4; King's College, Newcastle, September 1-3. Further particulars can be obtained from these establishments.

NEW HYDROGEN PEROXIDE PLANT

(*Continued from previous page*)

fluenced the firm's decision to build at Warrington. Not the least of these was the comparative ease with which the company's products could be transported to textile users in the North of England. The new works was not going to be a "utilitarian affair." Its design would please the eye and provision had been made for subsequent expansion to be controlled and symmetrical in layout.

Proposing the health of the guests, Mr. B. E. A. Vigers (Laporte Chemicals, Ltd.) announced that, while certain key personnel would be transferred to Walton from other Laporte works, most of the employees would be recruited locally.

Production in 1950

Responding on behalf of the guests, Dr. W. H. Garrett, chairman of the Association of Chemical and Allied Employers, said that the four main components of industry, labour, capital, management and control had all been represented at the stone-laying ceremony and were united in wishing the firm every success in the new venture.

Hydrogenation Resumed in W. Germany

Fuel and other Shortages Hamper Large Expansion

A DECISION of considerable importance for the future of the German coal-oil industry was taken by the Bipartite Control Office last month when it gave permission for the use of the hydrogenation plants of Gelsenberg Benzin AG at Gelsenkirchen-Buer, and Union Rheinische Braunkohlen-Kraftstoff AG at Wesseling, near Cologne, for the treatment of refinery residues.

The permit for the resumption of hydrogenation operations in these two plants was issued as part of the bizonal plans for the refining of imported crude petroleum, and the residues to be treated at Buer and Wesseling will be by-products of normal oil-refining operations. The possibility of later use of these two plants for the treatment of coal or coal derivatives is not excluded. A third hydrogenation plant in the British zone, that at Scholven, is indeed to be used for other purposes even now.

The decision has caused the Fischer-Tropsch interests to revive their representations in favour of the resumption of the coal-oil synthesis, first of all at the Essener Steinkohle plant at Bergkamen. It is pointed out on their behalf that some of the fractions obtained in the Fischer-Tropsch plants, such as Kogasin I and II and paraffin "gatsch," are eminently suitable as starting materials for the manufacture of detergents; their use, it is argued, would not only reduce the demand for fatty acid from vegetable sources, but provide a valuable export which would yield several times more in foreign currency than is obtained by exporting coal in the natural state.

Less Coal for Chemicals

These demands are unlikely to be supported by other chemical interests in Western Germany, for the shortage of coal is still the main obstacle in the way of further output expansion. The fuel quota for the chemical industry has been reduced from 565,000 metric tons to 506,000 tons for the three-months' period (in terms of bituminous coal), and most of this goes to the big heavy chemicals works, with the result that the maximum supply for medium-sized and small plants engaged in other production processes is less than 25,000 tons a month.

The chemical industry has asked that the quota should be raised to 784,000 tons for the three-months' period, which would leave 234,000 tons for free distribution to other than heavy chemicals works, trebling their monthly fuel supply.

Some of the biggest chemical enterprises, including Hoechster Farbwerke, Hoechst, Merck, Darmstadt, and Chasella, Frankfurt, did not exhibit at the Hanover Export Fair on the ground that, apart from practical difficulties, participation was futile because raw materials could not be obtained for carrying out additional export orders.

Chemical firms of international repute feel no anxiety about export orders. The dyestuffs industry in particular reports an excellent export business. Bayer, Leverkusen, now employing 14,000 workers again, has received a number of fresh orders from South Africa, India, Switzerland and Austria. Bayer is also making a special insecticide for use against the Colorado beetle, but it is reported that the phosphorus required has to be recovered at great cost and effort from war ammunition, so that the German firm cannot compete with three American companies using the Bayer process.

Dearth of Phenol

While synthetic fibre factories are now somewhat better supplied with raw materials, plastics manufacturers continue to suffer from shortages of phenol, alcohol and camphor. More synthetic phenol could be made available if residual waters of lignite carbonisation works could be treated with tri-cresyl phosphate of which there is a shortage, and it is also hoped to buy phenol abroad through the Joint Export-Import Agency. Even then, however, the scheduled output of plastics is unlikely to be reached this year.

JEIA has been able to purchase abroad certain scarce raw materials. Thus graphite has been bought from Austria and tanning extracts from Italy. Pharmaceutical manufacturers have been promised supplies of certain quantities of essential oils, fats and crude drugs from Asia and South America. They are also to receive more alcohol.

In this as well as in other branches of the chemical industry, however, great difficulties are being caused by lack of packaging materials, especially glass and paper. Lack of containers is being felt severely by producers of industrial gases.

In the eastern zone of Germany the chemical industry is receiving rather less attention in the economic planning for the next two years than other industries which can help to replace supplies formerly obtained from the western zones.

That the chemical industry has not been

(*Continued overleaf*)

mentioned in the list of industries which are to expand their capacity may in part be due to the fact that some of the most important chemical works are operated by Soviet corporations without relation to the German economy, but the principal reason seems to be the inability of the "publicly-owned" undertakings to make anything like full use of the existing capacity.

Poor Results

In Saxony-Anhalt, chemically the most important region, the planned output figures were not reached anywhere in the chemical industry last year, and little has been heard of progress this year. The production of phosphatic fertilisers, though stimulated by arrivals of apatite from the Cola Peninsula, reached only one-third of the scheduled output, according to the latest available figures, and nowhere has production exceeded four-fifths of the planned figure.

At the buna rubber works at Schkopau ambitious plans have been put into effect to produce a variety of chemicals not directly connected with the manufacture of synthetic rubber. New machines and equipment to the value of several million marks are said to have been ordered. Foreign currencies have been allocated for installations which have to be imported, while part of the machinery has been dismantled and exchanged against other machinery which is required for the proposed additional manufactures.

It is claimed that more than half the present output of synthetic rubber at Schkopau remains in Germany, and dichloroacetic acid, detergents, fillers and solvents are to be produced in future, in addition to synthetic rubber.

The chemical industry of the Soviet zone will have to play an important part in the proposed re-orientation of Eastern Germany's foreign trade towards the Soviet Union and other countries of Eastern Europe. It may be expected that efforts will be made to resume the close co-operation between the chemical industry of the Halle-Merseburg-Bitterfeld area with the Upper Silesian mining district which existed before the war, when part of the latter belonged to Germany.

Fuel and labour shortage seem to present the greatest difficulties in the chemical industry of Eastern Germany at the moment.

GERMAN SOAP FORMULAE : BIOS REPORT

AN interesting feature of BIOS Report No. 25* is the listing of a number of soap formulæ including those of pre-war and wartime vintages.

The well-known "Puck" abrasive soaps made by Sunlight Gesellschaft A.G. have the following composition: Fatty acid 5 per cent, powdered quartz 48 per cent, powdered marble 48 per cent, moisture 1 per cent. A typical fat charge used in pre-war soaps made by the same firm is as follows: Coconut oil 20 per cent, tallow 50 per cent, hardened whale oil 30 per cent. The pre-war grade of shaving soap had an 85 per cent fatty acid content, the fatty acids being compounded thus: Stearine 70 per cent, coconut oil fatty acids 10 per cent, tallow 10 per cent, groundnut fatty acids 10 per cent.

German laundries used a composition known as "Sava" consisting of soda ash 65 per cent, waterglass 20 per cent, fatty acids 3 per cent, and water 12 per cent. A typical pre-war toothpaste contained calcium carbonate 52 per cent, glycerine 16 per cent, sodium ricinoleate 6 per cent. gum tragacanth 1.5 per cent, titanium dioxide 1.5 per cent, perfume 1.5 per cent, and moisture 21.5 per cent.

Two representative pre-war shampoo powders were constituted as follows: (1) (Soap based): Soap (from equal proportions of coconut oil and tallow used as the fat charge) 60 per cent, borax 20 per cent, and sodium bicarbonate 20 per cent. (2) (Synthetic based): Igepon KT 46 per cent, sodium sulphate 50 per cent, and adipic acid 4 per cent. Wartime tube shortages encouraged the use of solid toothpaste blocks made to the following formula: soap 10 per cent, kaolin 40 per cent, chalk 40 per cent, and moisture 10 per cent.

Electron Microscopy

The authors of BIOS Final Report No. 1671* state that their primary objective had been to direct research workers to the most fruitful sources of German information on electron microscopy, and some success has attended their endeavours. There is a list of German workers in electron microscopy, and their functions and activities. Details are given of a variety of publications connected with the subject.

* These reports are issued with the usual warning regarding the possible infringement of existing patent rights.

CHEMICALS LEAD U.S. INDUSTRIES

A Decade of Rapid Expansion

AMERICA's output of basic chemicals and numerous related products, including plastics, drugs, cosmetics, paints and fertilisers, has developed so rapidly within the past 25 years that the industry as a whole now represents "the largest segment in the nation's total manufacturing enterprise." Such is the conclusion reached in a survey prepared by the Manufacturing Chemists' Association, Washington, D.C.

Even such basic industries as steel and food production failed to exceed last year's total sales figure of $11,000 million attained by the chemical process industries.

The Federal Reserve index shows an increase of 340 per cent in the output rate of chemicals and allied products between 1923 and 1947. Despite the fact that total production in these fields fell last year from the wartime peak of 1943, the volume of basic chemicals consumed by industry was greater than in 1944, the record year for this section of the trade.

"The trend since 1940 has shown a rate of activity in industrial chemicals far greater than that for all manufacturing industries, with the spread between the two classifications continually widening," the report states, "and all indications point toward a continuation of this trend for some time to come."

Contributory Factors

The principal reasons for the rapid growth of the U.S. chemical industry, the report states, are the progressive attitude of management, expanding research, the ability to create new and better products to meet the demands of ever-growing markets, and the fact that the chemical industry is a primary producer for virtually all manufacturing and non-manufacturing industries, as well as a consumer of its own products.

The report describes research as "the keystone of development and progress in the chemical industry," and says that industrial chemical producers alone are spending $65 million annually in this direction.

Dealing with labour recruitment, the report points out that the introduction of specialised processes within the industry has resulted in a demand for employees possessing a higher standard of intelligence and this, in turn, has necessitated an increase in the average weekly wage, which is now $60·97 compared with $52.17 paid by other industries.

The survey reveals that one important feature resulting from the expansion of the U.S. chemical process industry is the extent to which decentralisation has been carried out and points out that in contrast to 1929, when about 84 per cent of America's basic chemicals was produced in the north-eastern area, the western States, including California, Nevada, and Washington, are rapidly emerging as chemical production centres, mainly as a result of cheap hydro-electric power and easy access to raw materials, such as petroleum, natural gas, salt and timber.

East Texas, too, is described as a "potential treasure house for the manufacture of chemicals" owing to low power costs and the vast natural deposits of sulphur, salt and limestone. The report adds that more than $1000 million has been invested in chemical production in this area.

Quoting statistics compiled by the International Trade Section of the U.S. Department of Commerce, the survey says that America's foreign sales of chemicals in 1947 totalled well over $800 million. Canada was the best customer, purchasing $117 million worth of manufactured chemical products.

U.S. Power Shortage

Effect on Aluminium Production

AN indication that the biggest obstacle to increasing aluminium production in the U.S.A. is the lack of electric power facilities was given last week by Mr. Roy A. Hunt, president of the Aluminium Company of America. He urged U.S. industry to assist in solving the problem to meet industrial needs, particularly those of the electro-chemical industries.

Mr. Hunt said it was his company's intention to use natural gas instead of water power for the generation of the electric power required for aluminium production at Alcoa's new 22 million lb. capacity plant at Point Comfort, Texas. The Alcoa power plant would be capable of generating approximately 700 million kWh. of electricity annually. This plant is part of its $125 million post-war expansion programme to help relieve the national shortage of aluminium products.

U.S. aluminium industry statistics reveal that present annual capacity is approximately 1250 million lb. as compared with a wartime potential of 2100 million lb.; U.S production in 1947 totalled only 1143 million. Production in 1948 is expected to be lower still.

HYGROSCOPIC ADSORBENTS

Inert Materials for Industrial and Laboratory Use

By A. E. WILLIAMS, F.C.S.

THE presence of water vapour in many types of gases is responsible for much damage and general loss of efficiency. In some cases it leads to complete failure in manufacturing processes, and generally gives rise to corrosion of plant and equipment. The solution of the problem of constantly and effectively eliminating varying quantities of water from gases moving at both high and low velocities, over a wide range of temperatures, was by no means an easy matter.

There are many types of hygroscopic materials which will take up moisture from a gas passed through them; but they fail because they are either not inert to the gas, or the water they have taken up cannot be quickly and economically expelled again.

Silica Gel

Of the various hygroscopic materials which have been tried out, there are, however, two that have met with much success, silica gel and activated alumina. Both have a high adsorption capacity for moisture in gases, they are inert, and the water they take up can be quickly expelled by a simple heating process, leaving the material in its original fresh state of activation.

The adsorption of moisture from gases by means of any solid adsorbent is generally governed by the type and surface area of the porous structure of the adsorbing medium. Silica gel has a pore surface of about 50,000 sq. ft. per cu. in. and it is capable of condensing in its pores up to half its own weight of water vapour.

As it is a manufactured form of silica, it possesses the inert properties of that material; if a chemical will not attack sand, it will not attack silica gel.

Physical Adsorption

When it adsorbs vapours, the action of silica gel is entirely physical and the adsorption of moisture does not cause any change in size or external wetting of the gel, even when the gel is completely saturated with moisture. No corrosive material is given off the gel as the result of the adsorption.

Adsorption of water vapour from gases by means of silica gel will continue until equilibrium is established between the vapour pressure of the adsorbed water in the gel and the vapour pressure of the surrounding atmosphere. The drying of gases is accomplished chiefly by the process of dynamic adsorption, wherein the gas to be dried is constantly passed through a layer of silica gel (as opposed to static adsorption, in which the gel is placed in an enclosed space containing the gas and no attempt is made to produce a more intimate contact).

When a stream of moist gas is passed through a layer of the gel the efficiency with which the water in the gas is taken up by the gel is governed by several factors, such as the temperature and vapour pressure of the gas entering the gel, the temperature of the gel, velocity of the gas stream and the concentration of water vapour it carries. The efficiency of dehydration obtainable, under isothermal conditions, is indicated by the curves in Fig. 1.

Silica gel has been successfully applied to the drying of compressed air and compressed gases of various types; drying air for ozone production; drying gases for bright annealing furnaces; the adsorption of moisture from air in workrooms requiring humidity control for production purposes, such as in the manufacture of insulating materials, confectionery, pharmaceutical products, etc.

The regeneration of the gel, or the expulsion of the water it has adsorbed, can be accomplished simply by heating the gel to approximately 300° F. This process of reactivation may be carried out an unlimited number of times. Equipment can thus be installed to supply dry air or gases continuously.

In an average installation there would be

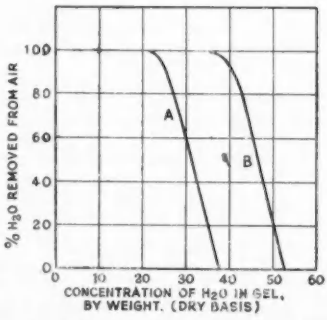


Fig. 1. Curves showing dehydration efficiency obtainable under isothermal conditions

two or more adsorption vessels containing silica gel; while one is adsorbing, another is being regenerated. Silica gel and appropriate plants for its various uses have been developed by Silica Gel, Ltd.

The other most effective agent for the drying of gases, activated alumina, takes up moisture with extreme avidity at very low dew points. Being a hard granular material, it does not change in form or volume even when saturated with moisture; it is chemically inert, entirely non-corrosive, and may be regenerated repeatedly.

Gas Drying under Pressure

Dew points even lower than −70° C. are easily obtained by drying the gas under pressure, then expanding it. In the laboratory, moist air of dew point 12 to 15° C. may be dried to a dew point under −80° C. by passing it, even at a velocity of 20 cu. ft. per hour, through 1 lb. of 16/32 mesh activated alumina contained in an ordinary glass drying tower about 12 in. high by 2½ in. diameter. Air of dew point lower than −80° C. is given at the above rate by this laboratory apparatus for almost five hours. A dew point of −80° C. is the equivalent of 2.5×10^{-8} lb. $= 1.75 \times 10^{-6}$ grains per cu. ft. of air.

Activated alumina has been developed in this country by Peter Spence & Sons, Ltd., which makes the material in various grades adapted to individual requirements. Grade refers to size or mesh of the alumina, and the grades most in use are 2/4 and 4/8 mesh. Much finer mesh material than this is produced, and the 16/32 grade, for example, contains over 50 per cent, passing through 1/32 in. mesh. Provision is made at the other extreme, by pieces over ½ in. in size.

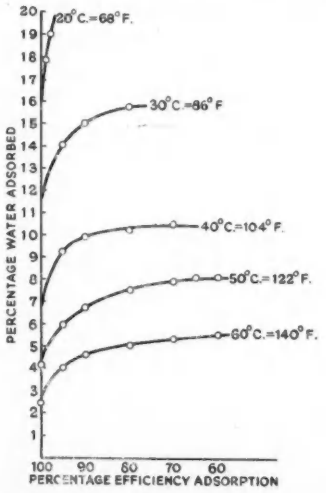


Fig. 2. Adsorption of water vapour, showing percentage efficiency

Rate of Flow

Contrary to what might be expected, the larger grades of activated alumina are not slower or less efficient in the dynamic drying of gases. The capacity of alumina for moisture in this drying process depends on the rate of flow of the gas, and with moderate rates of flow the alumina adsorbs 16 to 18 per cent of its weight of water in producing a commercially dry gas.

The graphs, Figs. 2 and 3, are plotted to show how the capacity of alumina for moisture in dynamic drying varies with the temperature. The efficiency of drying by alumina is greatest at low temperatures, as the graphs indicate. Percentage of water adsorbed equals the weight of water taken up by the alumina multiplied by 100, and divided by the weight of alumina; while the percentage efficiency of adsorption equals weight of water adsorbed multiplied by 100, and divided by weight of water adsorbed added to the weight of water passed through the alumina. For all temperatures there is an initial period of complete adsorption, then a definite break, whereafter the efficiency falls rapidly from 100 per cent.

Industrial Uses

The vapour pressure of water over the alumina varies with the percentage water adsorbed by the alumina, and as much as 8 per cent is adsorbed at 20° C. before the water vapour pressure rises above 0.4 mm. Hg.

The relative humidity of air in equilibrium with activated alumina is independent of temperature over the range 15-55° C. and with 15-75 per cent relative humidity.

A variety of industrial gases has been successfully dried by activated alumina, including hydrogen, cracked ammonia, CO_2, CO, chlorine, nitrous oxide, air, helium and argon; while hydrocarbon vapours have also been dried efficiently.

To ensure complete contact between the alumina and moist gas it is desirable that the adsorption towers used in industry should have a height about four times their diameter.

As the particle size of the alumina used has no effect on the efficiency of drying, the pressure drop in such a bed of alumina can be reduced by employing one of the larger mesh sizes, where this is necessary.

Heat is liberated during the adsorption process and in small types of dryer the heat

is generally dissipated from the surface of the alumina container, while some heat is carried along with the dried gas. In larger dryers, however, provision is made for internal cooling, since the effectiveness of drying falls off rapidly when the temperature of the alumina rises above 30° C.

Collecting Impurities

In handling gases containing impurities such as grit, soot, dust, oil, etc., which would contaminate and shorten the life of the main alumina bed, it is desirable to use a small prefilter of alumina to collect such heterogeneous matter before the gas proceeds through the larger dryer.

As activated alumina has a high mechanical strength, very large towers packed with this material may be used, without the weight of the upper portions breaking down those below. In normal industrial use two, or more, towers are employed in relay.

To reactivate the alumina a temperature of 230-250° C. is recommended, but temperatures as low as 150° C. can be used if the material is not required for intensive drying and a decrease of about 2 per cent in the moisture adsorption figure is immaterial.

Alumina Reactivation

The reactivation may be carried out by using the gas about to be dried to carry away the moisture, or by using a separate

(*Continued at foot of next column*)

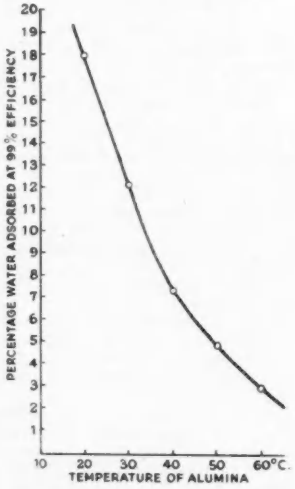


Fig. 3. Adsorption of water vapour by alumina at varying temperatures

air or waste gas supply. In either case, the gas used for reactivation should flow in the opposite direction to the gas which has just been dried.

Passage of hot gas through the alumina is generally the most suitable method for small units. For complete reactivation, heating should be continued for about four hours after the gas leaving the column has attained a temperature of 230° C. Other means of supplying heat for reactivation include the use of steam or hot oil passing through coils embedded in the alumina, a steam coil being readily adaptable as a cooling coil. Heating by electrical resistance heaters, or by radio frequency, are other suitable alternatives.

EDUCATION CONFERENCE

A CONFERENCE on "The Education of the Young Worker" will be held at Manchester College, Oxford, during July 12-17 under the auspices of the University Department of Education, whose director is Mr. M. L. Jacks. The conference aims at bringing together representatives of all the voluntary and statutory organisations, of central and local government departments, and others concerned in the education, employment and welfare of young people between the ages of 15 and 20, who are no longer receiving full-time education.

It is hoped to produce a statement of policy setting out as clearly as possible the goals to be achieved in further education, whether in county college, industry or during leisure time. Suggestions will be made for practicable methods by which these goals can be reached through co-ordination and administration of all resources to form an integrated service, and some form of agreement will also be sought on the recruitment and training of all who will be responsible for these young people. Well-known people, especially experienced in some aspect of this work, have been invited to speak at the conference, further information about which can be obtained from the Director, University Department of Education, 15 Norham Gardens, Oxford.

Light Metal Statistics

Ministry of Supply statistics relating to light metals in April have been issued (in long tons) as follows: Virgin aluminium: production 2616, imports 8774. Secondary aluminium: production 7816. Uses (aluminium scrap arisings): 10,648, consumption 8690. Aluminium fabrication: 20,419. Magnesium fabrication: 226.

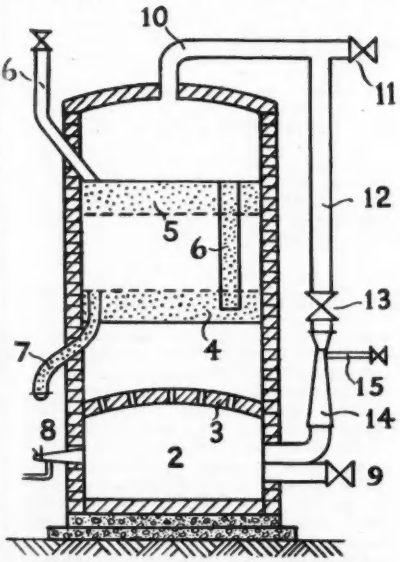
PRODUCING ACTIVE CARBON

Another Application of the Fluidised Bed

THE use of solids in the fluid state, that is, as fine powdered suspensions, successfully adopted in catalytic and other processes, has now been applied to the production of active carbon by the Cie. Industrielle de Procédés et d'Applications, in Fribourg, Switzerland. Patent applications, which include the special type of furnace used, have been filed in France (Nos. 533,884, 537,938), in Switzerland (No. 14,559), and in the U.S.A. (Ser. No. 767,209). An account of the apparatus and method has been given by A. Godel (*Chim. et Ind.* 1948, *59*, 437-9, May).

In producing activated carbon, it is essential that the treatment, *e.g.*, in water gas, should be perfectly uniform and regular. It has now been found that this and other conditions may best be fulfilled by treating the crude carbonaceous material in a fluid state in a new design of furnace.

The process, which is now being used on an industrial scale in Normandy, briefly consists in exposing to the activating gas at about 900° C. raw material in very finely granulated form, placed in layers of a few decimetres on perforated plates. The gas is enriched with water vapour and is capable of maintaining the layers in a turbulent state, as if boiling, without actually removing any of the material. In these conditions the moving mass presents all the physical appearance and properties of a liquid—diffusion, sedimentation, thermal and electric conductibility and rate of flow over a surface horizontal or sloping.



Furnace for industrial operations

The method may be applied on a laboratory scale by means of a simple device consisting of a vertical silica tube of 25 mm. inside diameter and 500 mm. long, open at the top and insulated. The tube is heated by electric wiring for 350 mm. of its length. Inside is placed a stainless steel grid supported by a second quartz tube 15 mm. diameter and about a third of the length of the larger tube. The latter is closed at bottom with a cork stopper supporting the inner tube and traversed by a pyrex tube connected with a drainage vessel.

Rapid Activation

After the outer tube has been brought to red heat, the raw material, sawdust, wood charcoal, or equivalent, is poured on the grid to form a layer about 100 mm. thick. Water vapour is supplied from below, and is superheated before passing through the layer of material. It is supplied at a pressure sufficient to keep the layer in a state of uniform turbulence. Activation is complete in 4-5 minutes.

Special furnaces on a large industrial scale have been designed (*see figure*). They are of cylindrical form, with hearth (2) surmounted by perforated vault (3), above which are two perforated platforms (4 and 5). The furnace is first pre-heated with the heavy oil burner (8), gas is circulated by the injector (14) through the open valve (13). The crude carbonaceous material, powdered peat or wood charcoal, is introduced through the feed pipe (6) on to grid (5). A turbulent layer forms here up to the level of overflow (not shown). The carbonised material then falls on to the platform (4) where it is fluidised by passage of the combustion gas, and is activated by superheated steam. It then passes out through outlet pipe (7). Excess carbonising gases escape through 11. Additional air is supplied through the inlet (9) for gas combustion. After a short time the furnace is self-heating and the burner unnecessary.

Among the advantages claimed, in addition to a better quality product, is the possibility of utilising abundant and cheap raw materials, such as granulated wood waste, peat, etc.

Inexpensive Chromated Protein Films

More Effective than Chemical Coating

CHROMATED protein coatings offering a convenient, inexpensive means of protecting metals—especially zinc, iron, brass, and aluminium—during outdoor storage in mildly corrosive atmospheres have been developed by U.S. National Bureau of Standards scientists, who say that the protective value of such films is better than that afforded by chemical surface treatments and is much superior to that of corrosion-inhibited oils and waxes. In providing protection the metallic surface to be coated is first dipped in casein, albumin, or gelatin; the resultant film is then impregnated with chromate, which both hardens the film and inhibits corrosion.

Constituents

Development of such protective films was the result of wartime necessity, arising from the scarcity of many non-ferrous metals. The principal constituents of the chromated protein films are a corrosion inhibitor for the metal, a protein which acts as a vehicle for the inhibitor, a hardening agent, and a bactericide to prevent putrefaction of the protein. The chromate always serves as the inhibitor and may act as the hardening agent and the bactericide as well. Other materials, however, such as formaldehyde, tannins, or certain salts of the heavy metals can be used as the hardening agent.

The four functioning constituents of the film can be applied in a single step or in several steps, according to the compatibility of the agents and the degree of protection desired. In the "two-step" process, which the Bureau found most satisfactory, the metal is first dipped in an aqueous protein solution. When the resulting protein film is dry, it is immersed in an acidified chromate solution for one-half to three minutes and allowed to dry without rinsing. The preparation of the protein solution varies somewhat with each protein. The chromate solution contains chromic acid (0.5 to 2 per cent) or a dichromate of zinc, iron, or nickel (1 to 10 per cent).

Chromated protein films are yellow and, unless opaque pigments have been added, are transparent. Their flexibility and adhesion are sufficient to prevent cracking or separation when the metal is bent. They are not injured by heating to 150°C., whereas most chromate films produced chemically on zinc lose much of their protective value at 100°C.

The films vary according to the viscosity of the protein solutions, the maximum usually being 0.0002 in. They are almost insoluble in water but are quickly removed by an alkaline solution. While they are more effective than direct phosphate or chromate coatings, their endurance is less than that of suitable paints.

Macaulay Institute Studies Fertiliser Economy

THE Macaulay Institute for Soil Research has initiated, and in some cases completed, an investigation into the economic use of fertiliser. In this connection, the annual report of the Institute states that important results obtained from experiments with phosphatic fertilisers have been communicated to colleges for demonstration to farmers.

Joint investigations with colleges and sister institutes, and with the Forestry Commission, have been continued and extended. Investigations in Galloway have shown there is a relationship between the pining of sheep and the nature of the rock from which the soil of affected areas has been derived.

The study of organic matter from the soil, and microbiological relationships has made rapid progress and a notable advance in knowledge achieved. The Institute, the report continues, is now regarded as a training centre for spectrographic workers both in this country and from overseas.

The plant physiological chemistry department is being developed and expanded, and facilities are now provided for the diagnosis and treatment of agricultural crops suffering from deficiency or malnutrition.

Colonial Publications

To deal with the increasing home and overseas demands for official colonial publications the Colonial Office announces that arrangements are being made for the reference section of the information department to receive, by air mail where possible, copies of all publications of this type. The section will file and index this material for reference and will publish each month a list of the preceding month's publications. This list will ultimately be substituted for the present Crown Agents list. These publications will be obtainable through the Crown Agents.

DEVELOPMENT OF FERTILISERS

Scope for More Co-ordinated Research

THE necessity of establishing adequate research facilities in this country for the study and development of new fertilisers was stressed by Dr. W. G. Ogg, director of the Rothamsted Experimental Station, during the course of a paper delivered last week at a meeting of the Fertiliser Society in London.

"Research work on new fertilisers," said Dr. Ogg, "involves fairly elaborate equipment and manufacturing facilities at any rate on a pilot-plant scale. In America much of it has been done by the U.S. Department of Agriculture and the Tennessee Valley Authority. At present, no organisation for this type of work exists in this country, apart from the research departments of the fertiliser manufacturers, but the idea of a research association has been mooted from time to time. Britain in the past has led the world in the development of fertilisers and it would indeed be unfortunate if she were now to lag behind."

Production Figures

The paper, which dealt with the influence of fertilisers upon food production, current methods of application and possible improvements both in technique and the quality of materials used, contained interesting data relating to field experiments during the last 100 years, together with a comparison of estimated crop yields from 1771 to 1945.

From these statistics, Dr. Ogg continued, it would appear that yields of wheat and oats are now about 12-13 bushels per acre greater than they were in pre-fertiliser days in the beginning of the 19th century and the increase for barley is nearly six bushels.

The yields for the period 1885-1894 were produced largely on a dung-lime-superphosphate husbandry. The consumption of superphosphate towards the end of the century was about 460,000 tons and of nitrogenous fertilisers about 60,000 tons sulphate of ammonia, and 100,000 tons nitrate of soda or, say, 25,000 tons nitrogen —a large proportion of the sulphate of ammonia produced in this country at that time being exported. The consumption of potash was negligible.

Comparing present-day estimated yields with those for that period we find there has been an increase of about 15-17 per cent in wheat, barley, potatoes and oats; other crops show little change.

Though these increases were partly attributable to improved methods of husbandry and better varieties of crops, they did provide an answer to the occasional assertion that yields have not increased during the past hundred years. Experiments had clearly shown that a considerable part of the increase could be attributed to the use of fertilisers.

Tests carried out at Rothamsted had revealed that a wheat yield as high as that obtained from a dressing of 14 tons of dung per annum could be obtained from fertilisers alone, especially when nitrogen was applied.

Further Research Desirable

Dealing with the world position in food and fertilisers, Dr. Ogg said it was an accepted fact that in the past a large percentage of the world's population had been underfed. Certain countries previously exporting plant nutrients were now faced with the problem of how to build up fertility, and this could only be achieved through the use of fertilisers to replace plant food elements removed in crops.

It was sometimes claimed that rotation of crops and stock farming would provide the remedy, but, valuable as these methods are, they would not replace the lime, phosphate and potash removed from the soil.

"It is pertinent to ask ourselves," Dr. Ogg continued," whether the fertilisers at present in use are the most suitable that can be obtained and whether the fertiliser manufacturers and the research stations are sufficiently active in seeking new and improved forms. As has already been mentioned, probably less than 20 per cent of the phosphate and often much less than 50 per cent of the nitrogen and potash applied can be accounted for in the crops. Perhaps granulation, pelleting and placement may make for increased efficiency."

Fertilisers should be cheap, efficient, easy to handle, capable of storage and of a sufficient range to meet the varied needs of soils and crops. In considering phosphatic fertilisers the chief aim should be to discover a means of preventing so much of the phosphate we apply from being locked up in the soil in a form not readily available to plants.

In this connection we had rather unnecessarily handicapped ourselves by legislation which required superphosphate and compound fertilisers to be valued in terms of their water-soluble phosphoric acid. Certain of the newer fertilisers had most of their phosphate in a form which was not water-soluble, but soluble in very dilute acid, and

this appeared to be just as available to plants and probably not as readily bound up in an insoluble form in the soil.

Such products as triple superphosphate and calcium metaphosphate contained much more P_2O_5 than ordinary superphosphate and there were various other forms produced by treating phosphate rock at very high temperatures. Research on these products was much further advanced in the United States than in this country.

Developments in U.S.

Some of the American developments in nitrogenous fertilisers were very interesting, involving the direct use of ammonia solutions and the employment of ammonia in the manufacture of other fertilisers, such as ammonium phosphate and ammoniated superphosphate. Urea, which was used both alone and in mixed fertilisers in America, might prove popular in this country if it could be produced cheaply.

We still had to find a slow-acting nitrogenous fertiliser to supplement the meagre supplies of slow-acting organic manures and research in this connection ought to receive high priority.

"There are those who contend," continued the speaker, "that we ought to use only what they term 'natural' organic manure, such as farmyard manure and compost, and who assert that fertilisers poison the soil and are harmful to crops, animals and human beings. There is no sound scientific evidence to support this view.

"Fertilisers, if properly used, help to build up soil fertility and to improve the quality of the produce. Apart from that, the amount of farmyard manure available is totally insufficient for present-day needs and the production of sufficient compost would employ land and labour essential for growing food."

There was no evidence that the intensive food production programme during the war had reduced the level of soil fertility. The land was probably in better condition than before, although some of it was short of potash, and much of our grassland had not received an adequate share of fertiliser because of crop priorities.

MAGNESIUM PRODUCTS: PROGRESSIVE SPANISH POLICY

LARGE-SCALE manufacture in Spain of magnesium, magnesium chloride and other salts is considered by P. L. Gomez (*ION*, March. 1948, 143-8). He states that a company has recently taken out patents for new production methods, and it is hoped Spain may soon become an important producer of these products, especially magnesium chloride.

Processes may be divided into those which start with natural minerals such as carnallite, gypsum, etc., and those requiring synthetic materials. The author argues against the treatment of magnesite with hydrochloric acid on economic grounds. He then discusses the double decomposition between magnesium sulphate and soluble chlorides. Epsom salts are plentiful in Spain, and analyses of samples from the numerous deposits are tabulated. Some of the principal sites are at Albacete, Toledo, Murcia, and Zaragoza. Although the natural salt is abundant enough, a preference is stated for synthesising the calcium sulphate by reacting sulphuric acid and dolomite waste products (calcium magnesium carbonate).

This method was used in Germany for producing, *inter alia*, carbonic snow, and a ton of sulphate thus prepared would require about 450 l. of acid of 65-66° Bé, 1580 kg. of dolomite, and 1360 l. of water. The cost would be 513 pesetas per ton, plus a further 80-100 pesetas for crystallising.

The sulphate may be decomposed with formation of the chloride, either hot or cold, in the former by reacting with calcium chloride and in the latter with sodium chloride; schematic plant layouts are given for both. In the hot process a pure, perfectly white, calcium sulphate (Epsom salts) is obtained, as well as a high-grade magnesium chloride which, when crystallised, costs about 1672 pesetas per ton.

The Epsom salts (709 kg.) is worth about 354.3 pesetas. Costs for the cold method are not given, but it is estimated that the necessary plant would be about 300,000 pesetas per ton of output. In the hot process the cost would be about 25,000 pesetas per ton of chloride.

No details of the patents are given, but they apparently cover both methods of decomposing the synthesised magnesium sulphate to yield the chloride.

Canadian Firm's Expansion.—As a result of the erection of a new factory at Shawinigan Falls, the Aluminium Company of Canada has recently increased its annual production by about 60,000 tons. Another aluminium plant is to be erected at Bute Bay, 150 miles north of Vancouver, and the company is reported to have been given an option by the Provincial Government on the utilisation of the available hydro-electric resources, estimated at 2 million kW.

INDUSTRY AND RESEARCH

I.C.I. Chairman Justifies "Lavish Expenditure"

SPEAKING at a dinner held in Glasgow on June 11 celebrating the 75th anniversary of the founding of Imperial Chemical Industries' Ardeer works at Stevenston, Ayrshire, Lord McGowan, the chairman, said that industrial effort must always be closely linked with scientific advancement and recalled that I.C.I. spent a minimum of £3,500,000 annually on research and development. Although every effort did not prove successful, the results obtained over the past 20 years had justified the continued expenditure.

In his opinion there was not the slightest doubt that Britain's industrial recovery and expansion would depend upon a lavish expenditure on research, and he thought industry would have to maintain a close liaison with the universities.

Research at Universities

Some two years ago, Lord McGowan continued, I.C.I. decided to establish Fellowships in various universities throughout the country for research work. The company indicated the subjects in which the recipients of awards must be engaged, but at the same time told the university authorities there would be no commercial stipulations in this respect. It was also made clear that the results of such research would not be monopolised by I.C.I., but would be placed at the disposal of the country.

Lord McGowan instanced the production of Ardil from groundnuts as an example of wise expenditure on research. More than £200,000 had been spent upon the evolution of this protein textile material and subsequent output at the company's Dumfries factory would be in the neighbourhood of 10,000 tons a year.

Britain, the chairman continued, need not be ashamed of her past contributions to science, but many industrialists would be glad to see a more rapid application of scientific research to commercial production. America would appear to be giving us a lead in this respect.

Explosives Division Renamed

Lord McGowan announced that at a meeting of the board on the previous day it had been decided that the name of the explosives division of the company was to be changed to the Nobel Division, which stood for something far more comprehensive than explosives.

Sir Steven Bilsland, who also spoke at the dinner, traced the remarkable development of the Ardeer factory to its present status as the largest explosives factory in the world. The original site covered 100 acres and employed fewer than 100 workers who produced some 250 tons of dynamite in the first year of operation. To-day, there were 2000 buildings, covering 1800 acres, and providing employment for 6000 workers. To increase exports in the face of developing competition and to provide coal mines with cheaper and better explosives, the whole blasting explosives plant had been modernised, and the first of the new units had just started production.

SCI PLASTICS GROUP

THE 16th annual general meeting of the Plastics Group of the Society of Chemical Industry will be held on July 6 at Mansion House, W.1, at 5.45 p.m. It will be followed by a lecture by Dr. Emil Ott (research director, Hercules Powder Co., U.S.A.) entitled "The Relation of Physical Characteristics and Chemical Structure of Cellulose Derivatives." Arrangements have been made for members to visit the works of Kodak, Ltd., Wealdstone, at 2 p.m.

Two vacancies on the committee will be filled from the following nominees: Mr. P. S. Adamson (BX Plastics, Ltd.), Mr. D E. Eddowes (Paint Research Station), Mr. H. V. Potter (Bakelite, Ltd.), and Mr. L. M. Read (British Resin Products, Ltd.).

Membership of the Group has continued to increase by about 50 annually—to 750.

Supply of Dyestuffs

REPRESENTATIVES of the Dyestuffs Manufacturers' and of the Colour Users' Associations met officials of the Board of Trade on June 11 to consider the supply of dyestuffs required to meet the increasing output of the cotton and other textile industries. After a full discussion of the needs and of the steps being taken to increase the supplies of dyestuffs, it appeared that total supplies would be ample, although serious shortages in certain lines were likely to continue for a time. The importance of utilising available supplies in such a way as to avoid prejudice to the export trade was accepted, and the textile finishers undertook to discuss this matter with their customers. It was agreed that further joint meetings should be held periodically.

Census of Production

Report on Chemicals and Drugs

THE Partial Census of Production, 1946 (Report No. 4) in respect of chemicals, dyestuffs and drugs, has resulted in the issue of a preliminary report which is published in *The Board of Trade Journal*. It consists of seven pages of tabular material grouped under production, sales and exports. Other tables deal with fuel and electricity purchased and used, employment and salaries, etc.

Production totals for 1946 and 1937 provide interesting comparisons for statisticians. Changed trading conditions and export and import objectives have resulted in important "ups" and "downs." Selected items are as follows (1937 figures in parenthesis): Hydrochloric acid (1.14 s.g.) 207,000 tons (192,400), nitric acid 65,900 tons (83,400), sulphuric acid 1,013,700 tons (906,000), carbon disulphide 27,500 tons (20,800), formaldehyde 49,700 tons (318,100), synthetic resins 40,300 tons (10,200). The majority of the sodium compounds produced in 1946 show marked decreases compared with 1937, *e.g.*, carbonate at 1,522,400 tons in 1937 dropped to 1,395,000 in 1946.

It is noted in the preamble that the Partial Census did not cover gas undertakings or coke and by-product works, thus valuable information on benzol, tar oil, and cresylic acid is not presented.

The following table summarising values in private industry for 1946 and 1937 is included in the census:—

	1946	1937
	£,000	£,000
Value of production (gross output)	212,217	77,210
Materials, fuel and electricity used	116,744	37,935
Amount paid for work given out	1,017	12
Estimated Excise Duty	—	750
Net output	94,456	38,513
	No.	No.
Average number of persons employed	141,575	83,697
	£	£
Net output per person employed	667	460

Increasing French Oil Refining

According to the *Economiste Européen*, Paris, French petroleum refineries treated last year 5.090 m. tons of crude (2.853 m. in 1946). The largest throughput, 1.770 m. tons, was achieved by the Cie. Française de Raffinage. The construction of a pipe-line linking Toulouse with Bordeaux (250 kilometres) is due to begin and will pipe gas to a new refinery for the production of motor fuel and butane.

ERP Metals

Latest U.S. Allocations to the U.K.

NEW allocations to the United Kingdom forming part of ERP were announced in Washington this week by Mr. Paul G. Hoffman, Economic Co-operation Administrator. These form part of a procurement authorisation to the value of more than £23 million for the benefit of the U.K., France, the Netherlands, the French zone of Germany, Austria, Denmark, Italy, Norway, Greece, Trieste and China. The allocation to Britain represents £9,075,000 and consists of the following:—

ALUMINIUM, purchased in Canada, $10,600,000 (£2,650,000).

COPPER, purchased in Canada, $1,500,000 (£375,000).

ZINC, purchased in U.S., $1,700,000 (425,000).

SULPHUR, purchased in U.S., $500,000 (£125,000).

LEAD, procured in Canada, $1,000,000 (£250,000).

In addition, 15 million dollars has been allocated for cheese to be purchased in the U.S.A., and 6 million dollars for tobacco purchases.

IMPORT LICENCES WARNING

THE Import Licensing Department of the Board of Trade states it has received evidence that import licences granted by the department are being sold to persons who are not in possession of the appropriate licences, or whose licences do not cover the quantities they wish to import. The Board emphasises that it is an offence under the Import, Export and Customs Powers (Defence) Act, 1939, for a person to import goods prohibited by the Import of Goods (Control) Orders 1940/45 without a licence granted to that person by the Board of Trade. If any cases come to the knowledge of the Board of Trade of direct or indirect traffic in import licences taking place, both parties to the transaction will render themselves liable not only to criminal proceedings and the cancellation of the licence or licences purporting to be transferred, but also, unless the Board are satisfied that no further trafficking will take place, to the refusal of any further import licences.

"Design Week" at Manchester.—Mr. Harold Wilson, President of the Board of Trade, will visit the Council of Industrial Design's exhibition "Design Fair" at Manchester on June 22. The fair is part of the city's "Design Week."

American Chemical Notebook

From Our New York Correspondent

TOTAL yearly production of low-purity oxygen by seven large plants now under construction in the U.S.A. is estimated at 40,000 million cu. ft., or nearly twice the 20,500 million cu. ft. of high-purity oxygen produced annually at the wartime peak. The five large potential markets for the new type of oxygen are for the production of synthetic liquid fuels, iron and steel, sulphuric acid, processed or reformed natural gas, and chlorine. Dr. C. R. Downs, a well-known consulting chemical engineer, said costs of 90-95 per cent oxygen appeared to range from $7.02 a ton for a plant producing 100 tons daily to $3.67 a ton for one operating at a rate of 1000 tons daily. These figures exclude the price of steam and other power-generating facilities and are based on amortisation of plant costs at the rate of 10 per cent annually.

* * *

The seven new plants now under construction and expected to be in operation in two to three years, and their approximate daily rated capacities are: Bethlehem Steel Company (150 tons for iron and steel production); Carthage Hydrocool Company (2000 tons for hydrocarbon synthesis); Stanolind Oil and Gas Company (2000 tons for hydrocarbon synthesis of natural gas); McCarthy Chemical Company (175 tons for the partial oxidation of hydrocarbons); Weirton Steel Company (400 tons for iron and steel); the E.I. du Pont de Nemours & Company, Inc. (360 tons for ammonia); Wheeling Steel Company (135 tons for iron and steel).

* * *

A rail tank car of more than 6000 gallons of crude shale oil—the first bulk shipment of oil from the Bureau of Mines' new oil shale demonstration plant near Rifle, Colorado—is undergoing preliminary tests in the laboratories of a private oil company at Riverside, Illinois, according to Mr. James Boyd, director of the bureau. The shale oil will be fractionated into the various grades of crude oil, by the Universal Oil Products Company at Riverside, after which the Union Oil Company will conduct cracking and other refining studies in its California laboratories. Meanwhile, in New York City, Mr. Reese H. Taylor, Union Oil Company president, said that his company has worked out a self-supporting heat method for the treatment of oil shales which may be of great value in the utilisation of the nation's vast shale deposits—estimated to amount to 260,000 million barrels of raw material at Colorado alone. His company's research staff, he said, had worked out a method of creating heat by burning the carbon on the shale residue, making the process "self-supporting" and dispensing with the need for large amounts of water, a problem that had halted earlier efforts in Colorado, where large water supplies are not available.

* * *

When a bottle of hair dye and a small keg of yellow bleaching powder tumbled to the floor of a Brooklyn, New York, post office this week the accidental mixture of the chemicals set off a series of minor explosions, caused a small fire, and injured five persons. The fire department extinguished the flames with Foamite. While the precise composition of the bleaching powder has not been ascertained, the manufacturer of the hair dye states that his product contained sulphur precipitate, glycerine, lead acetate and enough water to prevent it from being a fire hazard under normal conditions.

* * *

The British Embassy has notified Dr. A. V. Astin, assistant chief of the Electronics Division, National Bureau of Standards, Washington, D.C., that he has been awarded H.M. Medal for Service in the Cause of Freedom in recognition of "valuable services rendered to the Allied war effort." Dr. Astin, who was in England from September, 1944, to March, 1945, as representative of the National Bureau of Standards and of Division 4, National Defence Research Council, was engaged on the use and evaluation of the radio proximity fuse. As U.S. Government officials are not permitted to accept foreign decorations, the medal will be tendered to the Chief of Protocol, U.S. Department of State, who will hold it in custody until Dr. Astin's retirement from Government service.

* * *

Revocation of the conservation order M-131, which governed distribution and use of quinidine and cinchona bark derived from Government-owned stocks has been announced following Congressional ending of controls over these commodities. Estimated supplies of quinidine in the U.S.A. amount to 535,000 oz., of which 450,000 oz. will be imported and the remainder extracted from imported cinchona bark. While all quinidine and cinchona bark may now be sold free of allocation arrangements, export control remains.

A CHEMIST'S BOOKSHELF

Paint Performance—Its Assessment by Maker and User. W. Heffer & Sons, Ltd., Cambridge, 1948. Pp. 170. Price 10s. 6d. net.

Here are eight well chosen papers presented at a conference of the Oil and Colour Chemists' Association at Buxton, in 1947, in which all the salient features of paint testing and paint specifications were discussed by eminent technologists. H. A. Newnham dealt with testing decorators' finishes and the specification problem; H. B. Footner and G. Murray presented a joint paper on tropical paints, a subject hitherto neglected in the technical literature of the paint industry; F. G. Dunkley and D. P. Earp discussed the requirements of paints in railway service and some factors affecting their choice and evaluation and the steps taken to ensure the best results. H. Hollis dealt with the subject of performance testing of paints, with particular reference to tests which have a bearing on ultimate outdoor durability. Two papers on automobile paints were given by E. W. Plowman, viewing the subject from the paint manufacturers' angle, and H. H. Mason, representing the automobile manufacturer. R. J. Ledwith described the special requirements of aircraft finishes and the symposium concluded with a paper on the assessment of ships' paints for use in the Royal Navy by C. D. Lawrence and G. E. Gale. Each paper contains bibliography and other references and is accompanied by a complete text of the discussions. The latter, remarkable for their length, are the best indication of the interest residing in the twin subjects of testing and specification. The papers as a whole will be of great value to all those responsible for the drafting of paint standards and specifications, whether based on composition or performance tests, or both.

Grundlagen Der Werkstoffchemie. (Fundamentals of Material Chemistry). By Dr. E. Brandenberger. Rascher Verlag Zurich, 1947. Pp. 298. Fr. 21.

The author, professor at the Technical High School, Zurich, presents with this book an absorbing survey of the structure and constitution of chemical materials, which are not comprehensible by the means and conceptions of the classical chemistry but, as he says, can be considered only by the new techniques of crystal-chemistry. He gives a survey of the structure of inorganic and organic chemical materials under these new viewpoints and thus an introduction to crystal-chemistry, which has found its most significant application in material chemistry. Study of the character and phenomena of the various materials, the connection between their construction and their properties, can only be based on crystal-chemical fundamentals. The book is divided into three parts, which deal with one-dimensional, bi-dimensional and tri-dimensional atom-complexes, crystalline or pseudo-crystalline, their conditions, contrasts, transformations and a certain continuity of reactions in relation to their constitution. The book contains 98 figures, 27 tables, a comprehensive bibliography, a subject index and a list of the great range of materials dealt with. It is gratifying to note, that the contributions of British scientists are quoted as having played an outstanding part in this field and much space in the text is given to their work.

Prevention of Goitre

Iodised Salt Recommended

THE general use of iodised salt as a preventive against thyroid enlargement and goitre is advocated in a recent report issued by the Medical Research Council.

The procedure suggested is the addition of either one part of potassium iodide to 100,000 parts of all salt, or one part to 40,000 parts of packeted table salt. The report claims that if iodine intake were raised "it might be expected that the goitre would eventually disappear even in the areas of present high endemicity"

The widespread use of iodine in such a manner and in such minute concentrations should not produce any ill-effects, adds the report, and the extra retail cost for iodised salt would probably not exceed 4s. per head per annum.

The full text of this report is contained in M.R.C. No. 18 "Thyroid Enlargement and Other Changes Related to the Mineral Content of Drinking Water" (HMSO, 9d. net).

Technical Publications

BASIC materials so familiar as coal, iron and salt might seem hardly likely to provide subject matter of more than "refresher" interest. Yet the Staveley Coal & Iron Co., Ltd., for whom these three commodities have a special interest has produced a book —"The Staveley Story"—which presents the materials in a fresh and interesting light. The contributors are names well-known in journalism, industry, and the arts, and their combined efforts have resulted in a literary production of very wide appeal. One of the fifteen contributions, "Piping Round the World," by Mr. J. Langdon Davies, and illustrated by colour prints and line drawings by Mr. D. L. Ghilchik, takes one on a tour of a blast furnace and an iron foundry, in such a way that even so familiar an object as an iron pipe ceases to be commonplace.

* * *

Prevailing circumstances, such as rising costs of imported raw materials, higher wages, capital investment restrictions, dividend limitations, etc., renders the application of sound accounting principles a necessity. A timely reminder to paint manufacturers is contained in "Accounting in the Paint Industry," published by the Paint Materials Trade Association, price 5s. The subject is dealt with under two headings: General Accounting Principles, and Cost Accounting. A supplement of specimen bookkeeping forms adds to the value of this publication.

* * *

The widespread biochemical use of Heparin in blood transfusion, vascular surgery, prevention of thrombosis, and related conditions and treatments, is the subject of a booklet by Evans Medical Supplies, Ltd., entitled "Heparin—The Physiological Anticoagulant."

* * *

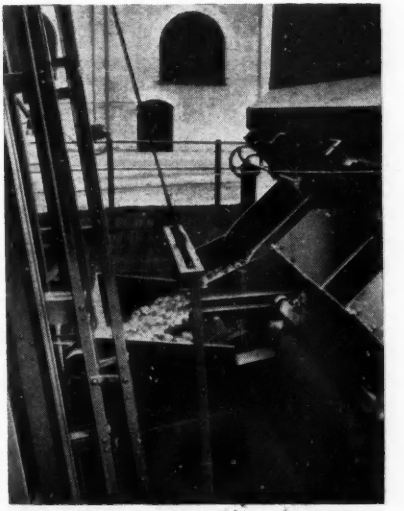
A special edition of "Towers Laboratory News," prepared in conjunction with the company's arrangements for the 1948 BIF, has a usefulness extending beyond its immediate aims. It surveys the wide range of scientific laboratory apparatus, fittings, and chemicals which the modern chemist requires, and as such is of permanent value. Notes on the services of the glassblowing department, which has facilities for producing special glass apparatus to clients' specification, are a reminder that the company is alive to the needs of research and development workers.

* * *

A booklet recently issued, "Continuous Venture," illustrated with 50 pictures, relates the history of John Summers and Sons, Ltd., which, in just under 100 years, has grown from a one-man clog-making works at Stalybridge to a vast steel firm, employing 6000 at the Hawarden Bridge Steelworks, Shotton, and more than 4000 others in subsidiary concerns. The modern Shotton works covers 250 acres and the continuous hot strip mill, capable of rolling more than 10,000 tons a week is housed in a shop over a quarter of a mile long. It contributed two million tons of sheet steel to the war effort.

* * *

Information supplied by the U.S. Rubber Reserve Co., the Ministry of Supply, and other authoritative sources, has been co-ordinated by the Research Association of British Rubber Manufacturers in Supplement No. SS16 "Supplementary Reports on Synthetic Rubber." Subjects dealt with include unsaturation of butadiene, fractionation of synthetic rubbers, molecular weight determination, stress-strain relaxation, retraction velocities, and resilience. Copies are obtainable from HMSO.



The automatic principle in handling heavy chemical materials is well illustrated by the "Angle-Hoist" Elevator, of which this is the self-operating device by which the skip—which conveys material overhead to a predetermined discharge point — is charged from hoppers controlled by automatic filler valves *(Courtesy of Strachan and Henshaw)*

Personal

Scottish OCCA Appointments

MR. JOHN INCH has been elected chairman of the Scottish section of the Oil and Colour Chemists' Association in succession to MR. J. V. CROSSLEY. MR. A. H. WHITAKER, the original hon. secretary of the section, now becomes vice-chairman. MR. T. C. CORBETT remains hon. secretary, and MR. H. NEWTON hon. treasurer. Committee members are MR. J. V. CROSSLEY MR. J CROOMBIE, MR. D. B. F. MACANDREW, MR. H. MCNAIR, MR. R. A. SIM, and MR. C. D. SMITH.

DR. W. G. HISCOCK has been appointed a director of Imperial Smelting Corporation.

MR. HAROLD GREENHALGH, a former vice-chairman of Lever Brothers, left £220,322.

During his recent visit to Spain, SIR ALEXANDER FLEMING was awarded the Grand Cross of Alfonso X by the Spanish Government, and received an honorary degree at Madrid University.

MR P. T. CHEVALLIER, managing director of Fisons, Ltd., and MR. J. A. BIRCH, of the company's advisory department, have left for East Africa at the invitation of the Overseas Food Corporation to inspect the groundnuts development scheme in Tanganyika.

(*Continued in next column*)

Mr. Lloyd Roberts (right), chief labour officer to I.C.I., shaking hands with a colleague (Mr. Cyril Morris) before leaving to take up his Ministry of Labour appointment (THE CHEMICAL AGE, *June* 12)

Birthday Honours

Four Knighthoods

THE following have received Knighthoods in the Birthday Honours List: MR. ELLIS HUNTER, chairman Dorman Long & Co.; MR. RICHARD CRICHTON, vice-chairman, Lancashire Steel Corporation; MR. GEOFFREY HEYWORTH, chairman, Lever Bros. & Unilever, Ltd.; and MR. HAROLD E. G. WEST, managing director, Newton Chambers & Co., and director National Benzole Co., Yorkshire Tar Distillers, etc.

MR. AMBROSE CALLIGHAN, member of the Steel Board and general secretary National Union of Blastfurnacemen, has received the C.B.E., and on MR. GEORGE R. BARCLAY, chairman of Wild-Barfield Electric Furnaces, Ltd., and MR. H. H. GREEN, assistant fields manager, Iraq Petroleum Co., Kirkup, are conferred O.B.E.s.

LT.-COL. C. E. L. FRENCH, superintendent of the Technological Department of the City and Guilds of London Institute, and MR. H. W. CREMER, president of the Institution of Chemical Engineers, receive the C.B.E.

Birmingham Appointment

PROF. H. W. MELVILLE, professor of chemistry at Aberdeen University and a representative of the DSIR, has been appointed Mason professor of chemistry and director of chemistry at Birmingham University.

MR. WILLIAM R. ROBERTS, chief inspector to the Pharmaceutical Society of Great Britain, has been called to the Bar. Apprenticed to pharmacy at the Royal Albert Edward Infirmary, he was for several years secretary of the Halifax and District Branch of the society.

Obituary

DR. J. C. STEARNS, one of the team of U.S. scientists engaged in wartime research on the atom bomb, has died aged 55. He was a former director of the metallurgical laboratories at Chicago University.

The death is announced of MR. S. H. FRANCIS, commercial manager of the steel foundry department of Edgar Allen & Co., Ltd., Sheffield. Born in Sheffield, he received his technical instruction at the Applied Science Department of the Sheffield University. He leaves a widow and three sons, one of whom, Mr. G. Francis, is a representative of Edgar Allen & Co. in the East Midlands.

DEVELOPMENT OF FERTILISERS

Scope for More Co-ordinated Research

THE necessity of establishing adequate research facilities in this country for the study and development of new fertilisers was stressed by Dr. W. G. Ogg, director of the Rothamsted Experimental Station, during the course of a paper delivered last week at a meeting of the Fertiliser Society in London.

"Research work on new fertilisers," said Dr. Ogg, "involves fairly elaborate equipment and manufacturing facilities at any rate on a pilot-plant scale. In America much of it has been done by the U.S. Department of Agriculture and the Tennessee Valley Authority. At present, no organisation for this type of work exists in this country, apart from the research departments of the fertiliser manufacturers, but the idea of a research association has been mooted from time to time. Britain in the past has led the world in the development of fertilisers and it would indeed be unfortunate if she were now to lag behind."

Production Figures

The paper, which dealt with the influence of fertilisers upon food production, current methods of application and possible improvements both in technique and the quality of materials used, contained interesting data relating to field experiments during the last 100 years, together with a comparison of estimated crop yields from 1771 to 1945.

From these statistics, Dr. Ogg continued, it would appear that yields of wheat and oats are now about 12-13 bushels per acre greater than they were in pre-fertiliser days in the beginning of the 19th century and the increase for barley is nearly six bushels.

The yields for the period 1885-1894 were produced largely on a dung-lime-superphosphate husbandry. The consumption of superphosphate towards the end of the century was about 460,000 tons and of nitrogenous fertilisers about 60,000 tons sulphate of ammonia, and 100,000 tons nitrate of soda or, say, 25,000 tons nitrogen—a large proportion of the sulphate of ammonia produced in this country at that time being exported. The consumption of potash was negligible.

Comparing present-day estimated yields with those for that period we find there has been an increase of about 15-17 per cent in wheat, barley, potatoes and oats; other crops show little change.

Though these increases were partly attributable to improved methods of husbandry and better varieties of crops, they did provide an answer to the occasional assertion that yields have not increased during the past hundred years. Experiments had clearly shown that a considerable part of the increase could be attributed to the use of fertilisers.

Tests carried out at Rothamsted had revealed that a wheat yield as high as that obtained from a dressing of 14 tons of dung per annum could be obtained from fertilisers alone, especially when nitrogen was applied.

Further Research Desirable

Dealing with the world position in food and fertilisers, Dr. Ogg said it was an accepted fact that in the past a large percentage of the world's population had been underfed. Certain countries previously exporting plant nutrients were now faced with the problem of how to build up fertility, and this could only be achieved through the use of fertilisers to replace plant food elements removed in crops.

It was sometimes claimed that rotation of crops and stock farming would provide the remedy, but, valuable as these methods are, they would not replace the lime, phosphate and potash removed from the soil.

"It is pertinent to ask ourselves," Dr. Ogg continued," whether the fertilisers at present in use are the most suitable that can be obtained and whether the fertiliser manufacturers and the research stations are sufficiently active in seeking new and improved forms. As has already been mentioned, probably less than 20 per cent of the phosphate and often much less than 50 per cent of the nitrogen and potash applied can be accounted for in the crops. Perhaps granulation, pelleting and placement may make for increased efficiency."

Fertilisers should be cheap, efficient, easy to handle, capable of storage and of a sufficient range to meet the varied needs of soils and crops. In considering phosphatic fertilisers the chief aim should be to discover a means of preventing so much of the phosphate we apply from being locked up in the soil in a form not readily available to plants.

In this connection we had rather unnecessarily handicapped ourselves by legislation which required superphosphate and compound fertilisers to be valued in terms of their water-soluble phosphoric acid. Certain of the newer fertilisers had most of their phosphate in a form which was not water-soluble, but soluble in very dilute acid, and

this appeared to be just as available to plants and probably not as readily bound up in an insoluble form in the soil.

Such products as triple superphosphate and calcium metaphosphate contained much more P_2O_5 than ordinary superphosphate and there were various other forms produced by treating phosphate rock at very high temperatures. Research on these products was much further advanced in the United States than in this country.

Developments in U.S.

Some of the American developments in nitrogenous fertilisers were very interesting, involving the direct use of ammonia solutions and the employment of ammonia in the manufacture of other fertilisers, such as ammonium phosphate and ammoniated superphosphate. Urea, which was used both alone and in mixed fertilisers in America, might prove popular in this country if it could be produced cheaply.

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"Fertilisers, if properly used, help to build up soil fertility and to improve the quality of the produce. Apart from that, the amount of farmyard manure available is totally insufficient for present-day needs and the production of sufficient compost would employ land and labour essential for growing food."

There was no evidence that the intensive food production programme during the war had reduced the level of soil fertility. The land was probably in better condition than before, although some of it was short of potash, and much of our grassland had not received an adequate share of fertiliser because of crop priorities.

MAGNESIUM PRODUCTS: PROGRESSIVE SPANISH POLICY

LARGE-SCALE manufacture in Spain of magnesium, magnesium chloride and other salts is considered by P. L. Gomez (*ION*, March, 1948, 143-8). He states that a company has recently taken out patents for new production methods, and it is hoped Spain may soon become an important producer of these products, especially magnesium chloride.

Processes may be divided into those which start with natural minerals such as carnallite, gypsum, etc., and those requiring synthetic materials. The author argues against the treatment of magnesite with hydrochloric acid on economic grounds. He then discusses the double decomposition between magnesium sulphate and soluble chlorides. Epsom salts are plentiful in Spain, and analyses of samples from the numerous deposits are tabulated. Some of the principal sites are at Albacete, Toledo, Murcia, and Zaragoza. Although the natural salt is abundant enough, a preference is stated for synthesising the calcium sulphate by reacting sulphuric acid and dolomite waste products (calcium magnesium carbonate).

This method was used in Germany for producing, *inter alia*, carbonic snow, and a ton of sulphate thus prepared would require about 450 l. of acid of 65-66° Bé, 1580 kg. of dolomite, and 1360 l. of water. The cost would be 513 pesetas per ton, plus a further 80-100 pesetas for crystallising.

The sulphate may be decomposed with formation of the chloride, either hot or cold, in the former by reacting with calcium chloride and in the latter with sodium chloride; schematic plant layouts are given for both. In the hot process a pure, perfectly white, calcium sulphate (Epsom salts) is obtained, as well as a high-grade magnesium chloride which, when crystallised, costs about 1672 pesetas per ton.

The Epsom salts (709 kg.) is worth about 354.3 pesetas. Costs for the cold method are not given, but it is estimated that the necessary plant would be about 300,000 pesetas per ton of output. In the hot process the cost would be about 25,000 pesetas per ton of chloride.

No details of the patents are given, but they apparently cover both methods of decomposing the synthesised magnesium sulphate to yield the chloride.

Canadian Firm's Expansion.—As a result of the erection of a new factory at Shawinigan Falls, the Aluminium Company of Canada has recently increased its annual production by about 60,000 tons. Another aluminium plant is to be erected at Bute Bay, 150 miles north of Vancouver, and the company is reported to have been given an option by the Provincial Government on the utilisation of the available hydro-electric resources, estimated at 2 million kW.

INDUSTRY AND RESEARCH

I.C.I. Chairman Justifies "Lavish Expenditure"

SPEAKING at a dinner held in Glasgow on June 11 celebrating the 75th anniversary of the founding of Imperial Chemical Industries' Ardeer works at Stevenston, Ayrshire, Lord McGowan, the chairman, said that industrial effort must always be closely linked with scientific advancement and recalled that I.C.I. spent a minimum of £3,500,000 annually on research and development. Although every effort did not prove successful, the results obtained over the past 20 years had justified the continued expenditure.

In his opinion there was not the slightest doubt that Britain's industrial recovery and expansion would depend upon a lavish expenditure on research, and he thought industry would have to maintain a close liaison with the universities.

Research at Universities

Some two years ago, Lord McGowan continued, I.C.I. decided to establish Fellowships in various universities throughout the country for research work. The company indicated the subjects in which the recipients of awards must be engaged, but at the same time told the university authorities there would be no commercial stipulations in this respect. It was also made clear that the results of such research would not be monopolised by I.C.I., but would be placed at the disposal of the country.

Lord McGowan instanced the production of Ardil from groundnuts as an example of wise expenditure on research. More than £200,000 had been spent upon the evolution of this protein textile material and subsequent output at the company's Dumfries factory would be in the neighbourhood of 10,000 tons a year.

Britain, the chairman continued, need not be ashamed of her past contributions to science, but many industrialists would be glad to see a more rapid application of scientific research to commercial production. America would appear to be giving us a lead in this respect.

Explosives Division Renamed

Lord McGowan announced that at a meeting of the board on the previous day it had been decided that the name of the explosives division of the company was to be changed to the Nobel Division, which stood for something far more comprehensive than explosives.

Sir Steven Bilsland, who also spoke at the dinner, traced the remarkable development of the Ardeer factory to its present status as the largest explosives factory in the world. The original site covered 100 acres and employed fewer than 100 workers who produced some 250 tons of dynamite in the first year of operation. To-day, there were 2000 buildings, covering 1800 acres, and providing employment for 6000 workers. To increase exports in the face of developing competition and to provide coal mines with cheaper and better explosives, the whole blasting explosives plant had been modernised, and the first of the new units had just started production.

SCI PLASTICS GROUP

THE 16th annual general meeting of the Plastics Group of the Society of Chemical Industry will be held on July 6 at Mansion House, W.1, at 5.45 p.m. It will be followed by a lecture by Dr. Emil Ott (research director, Hercules Powder Co., U.S.A.) entitled "The Relation of Physical Characteristics and Chemical Structure of Cellulose Derivatives." Arrangements have been made for members to visit the works of Kodak, Ltd., Wealdstone, at 2 p.m.

Two vacancies on the committee will be filled from the following nominees: Mr. P. S. Adamson (BX Plastics, Ltd.), Mr. D E. Eddowes (Paint Research Station), Mr. H. V. Potter (Bakelite, Ltd.), and Mr. L. M. Read (British Resin Products, Ltd.).

Membership of the Group has continued to increase by about 50 annually—to 750.

Supply of Dyestuffs

REPRESENTATIVES of the Dyestuffs Manufacturers' and of the Colour Users' Associations met officials of the Board of Trade on June 11 to consider the supply of dyestuffs required to meet the increasing output of the cotton and other textile industries. After a full discussion of the needs and of the steps being taken to increase the supplies of dyestuffs, it appeared that total supplies would be ample, although serious shortages in certain lines were likely to continue for a time. The importance of utilising available supplies in such a way as to avoid prejudice to the export trade was accepted, and the textile finishers undertook to discuss this matter with their customers. It was agreed that further joint meetings should be held periodically.

Census of Production

Report on Chemicals and Drugs

THE Partial Census of Production, 1946 (Report No. 4) in respect of chemicals, dyestuffs and drugs, has resulted in the issue of a preliminary report which is published in *The Board of Trade Journal*. It consists of seven pages of tabular material grouped under production, sales and exports. Other tables deal with fuel and electricity purchased and used, employment and salaries, etc.

Production totals for 1946 and 1937 provide interesting comparisons for statisticians. Changed trading conditions and export and import objectives have resulted in important "ups" and "downs." Selected items are as follows (1937 figures in parenthesis): Hydrochloric acid (1.14 s.g.) 207,000 tons (192,400), nitric acid 65,900 tons (83,400), sulphuric acid 1,013,700 tons (906,000), carbon disulphide 27,500 tons (20,800), formaldehyde 49,700 tons (318,100), synthetic resins 40,300 tons (10,200). The majority of the sodium compounds produced in 1946 show marked decreases compared with 1937, *e.g.*, carbonate at 1,522,400 tons in 1937 dropped to 1,395,000 in 1946.

It is noted in the preamble that the Partial Census did not cover gas undertakings or coke and by-product works, thus valuable information on benzol, tar oil, and cresylic acid is not presented.

The following table summarising values in private industry for 1946 and 1937 is included in the census:—

	1946	1937
	£,000	£,000
Value of production (gross output)	212,217	77,210
Materials, fuel and electricity used	116,744	37,935
Amount paid for work given out	1,017	12
Estimated Excise Duty	—	750
Net output	94,456	38,513
	No.	No.
Average number of persons employed	141,575	83,697
	£	£
Net output per person employed	667	460

Increasing French Oil Refining

According to the *Economiste Européen*, Paris, French petroleum refineries treated last year 5.090 m. tons of crude (2.853 m. in 1946). The largest throughput, 1.770 m. tons, was achieved by the Cie. Française de Raffinage. The construction of a pipe-line linking Toulouse with Bordeaux (250 kilometres) is due to begin and will pipe gas to a new refinery for the production of motor fuel and butane.

ERP Metals

Latest U.S. Allocations to the U.K.

NEW allocations to the United Kingdom forming part of ERP were announced in Washington this week by Mr. Paul G. Hoffman, Economic Co-operation Administrator. These form part of a procurement authorisation to the value of more than £23 million for the benefit of the U.K., France, the Netherlands, the French zone of Germany, Austria, Denmark, Italy, Norway, Greece, Trieste and China. The allocation to Britain represents £9,075,000 and consists of the following:—

ALUMINIUM, purchased in Canada, $10,600,000 (£2,650,000).

COPPER, purchased in Canada, $1,500,000 (£375,000).

ZINC, purchased in U.S., $1,700,000 (425,000).

SULPHUR, purchased in U.S., $500,000 (£125,000).

LEAD, procured in Canada, $1,000,000 (£250,000).

In addition, 15 million dollars has been allocated for cheese to be purchased in the U.S.A., and 6 million dollars for tobacco purchases.

IMPORT LICENCES WARNING

THE Import Licensing Department of the Board of Trade states it has received evidence that import licences granted by the department are being sold to persons who are not in possession of the appropriate licences, or whose licences do not cover the quantities they wish to import. The Board emphasises that it is an offence under the Import, Export and Customs Powers (Defence) Act, 1939, for a person to import goods prohibited by the Import of Goods (Control) Orders 1940/45 without a licence granted to that person by the Board of Trade. If any cases come to the knowledge of the Board of Trade of direct or indirect traffic in import licences taking place, both parties to the transaction will render themselves liable not only to criminal proceedings and the cancellation of the licence or licences purporting to be transferred, but also, unless the Board are satisfied that no further trafficking will take place, to the refusal of any further import licences.

"Design Week" at Manchester.—Mr. Harold Wilson, President of the Board of Trade, will visit the Council of Industrial Design's exhibition "Design Fair" at Manchester on June 22. The fair is part of the city's "Design Week."

American Chemical Notebook

From Our New York Correspondent

TOTAL yearly production of low-purity oxygen by seven large plants now under construction in the U.S.A. is estimated at 40,000 million cu. ft., or nearly twice the 20,500 million cu. ft. of high-purity oxygen produced annually at the wartime peak. The five large potential markets for the new type of oxygen are for the production of synthetic liquid fuels, iron and steel, sulphuric acid, processed or reformed natural gas, and chlorine. Dr. C. R. Downs, a well-known consulting chemical engineer, said costs of 90-95 per cent oxygen appeared to range from $7.02 a ton for a plant producing 100 tons daily to $3.67 a ton for one operating at a rate of 1000 tons daily. These figures exclude the price of steam and other power-generating facilities and are based on amortisation of plant costs at the rate of 10 per cent annually.

* * *

The seven new plants now under construction and expected to be in operation in two to three years, and their approximate daily rated capacities are: Bethlehem Steel Company (150 tons for iron and steel production); Carthage Hydrocool Company (2000 tons for hydrocarbon synthesis); Stanolind Oil and Gas Company (2000 tons for hydrocarbon synthesis of natural gas); McCarthy Chemical Company (175 tons for the partial oxidation of hydrocarbons); Weirton Steel Company (400 tons for iron and steel); the E.I. du Pont de Nemours & Company, Inc. (360 tons for ammonia); Wheeling Steel Company (135 tons for iron and steel).

* * *

A rail tank car of more than 6000 gallons of crude shale oil—the first bulk shipment of oil from the Bureau of Mines' new oil shale demonstration plant near Rifle, Colorado—is undergoing preliminary tests in the laboratories of a private oil company at Riverside, Illinois, according to Mr. James Boyd, director of the bureau. The shale oil will be fractionated into the various grades of crude oil, by the Universal Oil Products Company at Riverside, after which the Union Oil Company will conduct cracking and other refining studies in its California laboratories. Meanwhile, in New York City, Mr. Reese H. Taylor, Union Oil Company president, said that his company has worked out a self-supporting heat method for the treatment of oil shales which may be of great value in the utilisation of the nation's vast shale deposits—estimated to amount to 260,000 million barrels of raw material at Colorado alone. His company's research staff, he said, had worked out a method of creating heat by burning the carbon on the shale residue, making the process "self-supporting" and dispensing with the need for large amounts of water, a problem that had halted earlier efforts in Colorado, where large water supplies are not available.

* * *

When a bottle of hair dye and a small keg of yellow bleaching powder tumbled to the floor of a Brooklyn, New York, post office this week the accidental mixture of the chemicals set off a series of minor explosions, caused a small fire, and injured five persons. The fire department extinguished the flames with Foamite. While the precise composition of the bleaching powder has not been ascertained, the manufacturer of the hair dye states that his product contained sulphur precipitate, glycerine, lead acetate and enough water to prevent it from being a fire hazard under normal conditions.

* * *

The British Embassy has notified Dr. A. V. Astin, assistant chief of the Electronics Division, National Bureau of Standards, Washington, D.C., that he has been awarded, H.M. Medal for Service in the Cause of Freedom in recognition of "valuable services rendered to the Allied war effort." Dr. Astin, who was in England from September, 1944, to March, 1945, as representative of the National Bureau of Standards and of Division 4, National Defence Research Council, was engaged on the use and evaluation of the radio proximity fuse. As U.S. Government officials are not permitted to accept foreign decorations, the medal will be tendered to the Chief of Protocol, U.S. Department of State, who will hold it in custody until Dr. Astin's retirement from Government service.

* * *

Revocation of the conservation order M-131, which governed distribution and use of quinidine and cinchona bark derived from Government-owned stocks has been announced following Congressional ending of controls over these commodities. Estimated supplies of quinidine in the U.S.A. amount to 535,000 oz., of which 450,000 oz. will be imported and the remainder extracted from imported cinchona bark. While all quinidine and cinchona bark may now be sold free of allocation arrangements, export control remains.

A CHEMIST'S BOOKSHELF

Paint Performance—Its Assessment by Maker and User. W. Heffer & Sons, Ltd., Cambridge, 1948. Pp. 170. Price 10s. 6d. net.

Here are eight well chosen papers presented at a conference of the Oil and Colour Chemists' Association at Buxton, in 1947, in which all the salient features of paint testing and paint specifications were discussed by eminent technologists. H. A. Newnham dealt with testing decorators' finishes and the specification problem; H. B. Footner and G. Murray presented a joint paper on tropical paints, a subject hitherto neglected in the technical literature of the paint industry; F. G. Dunkley and D. P. Earp discussed the requirements of paints in railway service and some factors affecting their choice and evaluation and the steps taken to ensure the best results. H. Hollis dealt with the subject of performance testing of paints, with particular reference to tests which have a bearing on ultimate outdoor durability. Two papers on automobile paints were given by E. W. Flowman, viewing the subject from the paint manufacturers' angle, and H. H. Mason, representing the automobile manufacturer. R. J. Ledwith described the special requirements of aircraft finishes and the symposium concluded with a paper on the assessment of ships' paints for use in the Royal Navy by C. D. Lawrence and G. E. Gale. Each paper contains bibliography and other references and is accompanied by a complete text of the discussions. The latter, remarkable for their length, are the best indication of the interest residing in the twin subjects of testing and specification. The papers as a whole will be of great value to all those responsible for the drafting of paint standards and specifications, whether based on composition or performance tests, or both.

Grundlagen Der Werkstoffchemie. (Fundamentals of Material Chemistry). By Dr. E. Brandenberger. Rascher Verlag Zurich, 1947. Pp. 298. Fr. 21.

The author, professor at the Technical High School, Zurich, presents with this book an absorbing survey of the structure and constitution of chemical materials, which are not comprehensible by the means and conceptions of the classical chemistry but, as he says, can be considered only by the new techniques of crystal-chemistry. He gives a survey of the structure of inorganic and organic chemical materials under these new viewpoints and thus an introduction to crystal-chemistry, which has found its most significant application in material chemistry. Study of the character and phenomena of the various materials, the connection between their construction and their properties, can only be based on crystal-chemical fundamentals. The book is divided into three parts, which deal with one-dimensional, bi-dimensional and tri-dimensional atom-complexes, crystalline or pseudo-crystalline, their conditions, contrasts, transformations and a certain continuity of reactions in relation to their constitution. The book contains 98 figures, 27 tables, a comprehensive bibliography, a subject index and a list of the great range of materials dealt with. It is gratifying to note, that the contributions of British scientists are quoted as having played an outstanding part in this field and much space in the text is given to their work.

Prevention of Goitre

Iodised Salt Recommended

THE general use of iodised salt as a preventive against thyroid enlargement and goitre is advocated in a recent report issued by the Medical Research Council.

The procedure suggested is the addition of either one part of potassium iodide to 100,000 parts of all salt, or one part to 40,000 parts of packeted table salt. The report claims that if iodine intake were raised "it might be expected that the goitre would eventually disappear even in the areas of present high endemicity"

The widespread use of iodine in such a manner and in such minute concentrations should not produce any ill-effects, adds the report, and the extra retail cost for iodised salt would probably not exceed 4s. per head per annum.

The full text of this report is contained in M.R.C. No. 18 "Thyroid Enlargement and Other Changes Related to the Mineral Content of Drinking Water" (HMSO, 9d net).

Technical Publications

BASIC materials so familiar as coal, iron and salt might seem hardly likely to provide subject matter of more than "refresher" interest. Yet the Staveley Coal & Iron Co., Ltd., for whom these three commodities have a special interest has produced a book —"The Staveley Story"—which presents the materials in a fresh and interesting light. The contributors are names well-known in journalism, industry, and the arts, and their combined efforts have resulted in a literary production of very wide appeal. One of the fifteen contributions, "Piping Round the World," by Mr. J. Langdon Davies, and illustrated by colour prints and line drawings by Mr. D. L. Ghilchik, takes one on a tour of a blast furnace and an iron foundry, in such a way that even so familiar an object as an iron pipe ceases to be commonplace.

* * *

Prevailing circumstances, such as rising costs of imported raw materials, higher wages, capital investment restrictions, dividend limitations, etc., renders the application of sound accounting principles a necessity. A timely reminder to paint manufacturers is contained in "Accounting in the Paint Industry," published by the Paint Materials Trade Association, price 5s. The subject is dealt with under two headings: General Accounting Principles, and Cost Accounting. A supplement of specimen bookkeeping forms adds to the value of this publication.

* * *

The widespread biochemical use of Heparin in blood transfusion, vascular surgery, prevention of thrombosis, and related conditions and treatments, is the subject of a booklet by Evans Medical Supplies, Ltd., entitled "Heparin—The Physiological Anticoagulant."

* * *

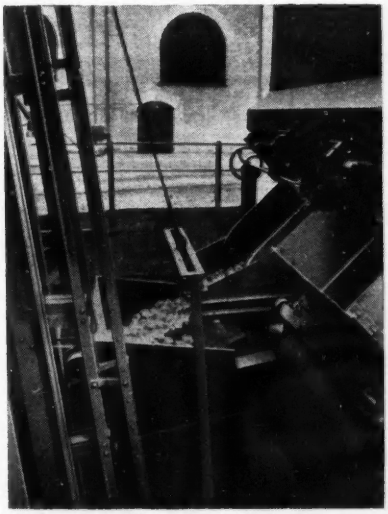
A special edition of "Towers Laboratory News," prepared in conjunction with the company's arrangements for the 1948 BIF, has a usefulness extending beyond its immediate aims. It surveys the wide range of scientific laboratory apparatus, fittings, and chemicals which the modern chemist requires, and as such is of permanent value. Notes on the services of the glassblowing department, which has facilities for producing special glass apparatus to clients' specification, are a reminder that the company is alive to the needs of research and development workers.

* * *

A booklet recently issued, "Continuous Venture," illustrated with 50 pictures, relates the history of John Summers and Sons, Ltd., which, in just under 100 years, has grown from a one-man clog-making works at Stalybridge to a vast steel firm, employing 6000 at the Hawarden Bridge Steelworks, Shotton, and more than 4000 others in subsidiary concerns. The modern Shotton works covers 250 acres and the continuous hot strip mill, capable of rolling more than 10,000 tons a week is housed in a shop over a quarter of a mile long. It contributed two million tons of sheet steel to the war effort.

* * *

Information supplied by the U.S. Rubber Reserve Co., the Ministry of Supply, and other authoritative sources, has been co-ordinated by the Research Association of British Rubber Manufacturers in Supplement No. SS16 "Supplementary Reports on Synthetic Rubber." Subjects dealt with include unsaturation of butadiene, fractionation of synthetic rubbers, molecular weight determination, stress-strain relaxation, retraction velocities, and resilience. Copies are obtainable from HMSO.



The automatic principle in handling heavy chemical materials is well illustrated by the "Angle-Hoist" Elevator, of which this is the self-operating device by which the skip—which conveys material overhead to a predetermined discharge point — is charged from hoppers controlled by automatic filler valves *(Courtesy of Strachan and Henshaw)*

Personal

Scottish OCCA Appointments

MR. JOHN INCH has been elected chairman of the Scottish section of the Oil and Colour Chemists' Association in succession to MR. J. V. CROSSLEY. MR. A. H. WHITAKER, the original hon. secretary of the section, now becomes vice-chairman. MR. T. C. CORBETT remains hon. secretary, and MR. H. NEWTON hon. treasurer. Committee members are MR. J. V. CROSSLEY MR. J CROOMBIE, MR. D. B. F. MACANDREW, MR. H. MCNAIR, MR. R. A. SIM, and MR. C. D. SMITH.

DR. W. G. HISCOCK has been appointed a director of Imperial Smelting Corporation.

MR. HAROLD GREENHALGH, a former vice-chairman of Lever Brothers, left £220,322.

During his recent visit to Spain, SIR ALEXANDER FLEMING was awarded the Grand Cross of Alfonso X by the Spanish Government, and received an honorary degree at Madrid University.

MR P. T. CHEVALLIER, managing director of Fisons, Ltd., and MR. J. A. BIRCH, of the company's advisory department, have left for East Africa at the invitation of the Overseas Food Corporation to inspect the groundnuts development scheme in Tanganyika.

(*Continued in next column*)

Mr. Lloyd Roberts (right), chief labour officer to I.C.I., shaking hands with a colleague (Mr. Cyril Morris) before leaving to take up his Ministry of Labour appointment (THE CHEMICAL AGE, *June* 12)

Birthday Honours

Four Knighthoods

THE following have received Knighthoods in the Birthday Honours List: MR. ELLIS HUNTER, chairman Dorman Long & Co.; MR. RICHARD CRICHTON, vice-chairman, Lancashire Steel Corporation; MR. GEOFFREY HEYWORTH, chairman, Lever Bros. & Unilever, Ltd.; and MR. HAROLD E. G. WEST, managing director, Newton Chambers & Co., and director National Benzole Co., Yorkshire Tar Distillers, etc.

MR. AMBROSE CALLIGHAN, member of the Steel Board and general secretary National Union of Blastfurnacemen, has received the C.B.E., and on MR. GEORGE R. BARCLAY, chairman of Wild-Barfield Electric Furnaces, Ltd., and MR. H. H. GREEN, assistant fields manager, Iraq Petroleum Co., Kirkup, are conferred O.B.E.s.

LT.-COL. C. E. L. FRENCH, superintendent of the Technological Department of the City and Guilds of London Institute, and MR. H. W. CREMER, president of the Institution of Chemical Engineers, receive the C.B.E.

Birmingham Appointment

PROF. H. W. MELVILLE, professor of chemistry at Aberdeen University and a representative of the DSIR, has been appointed Mason professor of chemistry and director of chemistry at Birmingham University.

MR. WILLIAM R. ROBERTS, chief inspector to the Pharmaceutical Society of Great Britain, has been called to the Bar. Apprenticed to pharmacy at the Royal Albert Edward Infirmary, he was for several years secretary of the Halifax and District Branch of the society.

Obituary

DR. J. C. STEARNS, one of the team of U.S. scientists engaged in wartime research on the atom bomb, has died aged 55. He was a former director of the metallurgical laboratories at Chicago University.

The death is announced of MR. S. H. FRANCIS, commercial manager of the steel foundry department of Edgar Allen & Co., Ltd., Sheffield. Born in Sheffield, he received his technical instruction at the Applied Science Department of the Sheffield University. He leaves a widow and three sons, one of whom, Mr. G. Francis, is a representative of Edgar Allen & Co. in the East Midlands.

Biochemical Achievement

Vital Liver Extract Isolated

SUCCESSFUL isolation of the obscure factor in liver extracts which is responsible for relieving Addisonian pernicious anaemia was claimed by Dr. E. Lester Smith, senior biochemist at Glaxo Laboratories, Ltd., Greenford, Middlesex, at a recent meeting of the Biochemical Society at Oxford. Almost simultaneously, two research teams, the one at Greenford and the other in the U.S.A., have announced that the elusive factor has been found.

Dr. Smith, who began this research ten years ago, and was assisted by his colleagues Hurran, Emery and Parker, recently discovered that the potent factor in the liver was a red substance more powerful than any known vitamin or hormone, and was active against pernicious anaemia in the minute dose of 1/200,000 of an ounce. He went on purifying the substance until it was 30 times purer than the original.

Minute Quantities

His final triumph occurred on May 20 when the red crystals lay beneath his microscope. It is estimated that no less than 10 tons of liver will be needed to produce a quarter gramme of crystals. A dose of

(*Continued at foot of next column.*

Dr. E. Lester Smith, employing the chromatography method of molecular filtration, which aided the isolation of the new substance

one two-millionth of an ounce is likely to be sufficient for the patient—a dose practically unparalleled by any other biological substance known to man.

"We shall, of course, try to discover the constitution of this substance," says Dr. Smith. "That will be very difficult; first, because it is a large molecule, and secondly because we may have to work up a hundred tons or so of liver to get enough material. Then we shall try to synthesise it."

Terms of Employment

Chemists' Rights and Obligations

A USEFUL review of the rights and obligations of qualified chemists is contained in *The Journal* of the British Association of Chemists, Vol. XXI, of which the following observations on "notice" merit attention:

"In the absence of an agreement to the contrary, an employer cannot terminate a chemist's employment by less than three months' notice. If he attempts to do so, the chemist is entitled to insist upon three months' notice, or salary in lieu. If this is refused the chemist can take legal proceedings to recover salary equivalent to this period."

Signing Contracts

In certain cases, it is emphasised, a notice-period of more than three months may be allowable, in which case competent legal advice (available from the BAC's Legal Aid Department) should be sought.

"It is very unwise," adds the BAC article, "to sign any contract or agreement without first having had legal advice upon it. The uncommon but reprehensible practice adopted by some employers of exerting pressure to secure a signature to an agreement without due consideration by the signatory ought to be contested by all chemists.

"An agreement is a legal document, and all the subscribers have a right to a legal opinion upon it before they become bound by it. To insist upon that is a duty that the chemist owes not only to himself but to his profession."

NCB RE-ORGANISATION

COMPLETE re-organisation of the National Coal Board was urged by Mr. William Pearson, general secretary, Scottish Area NUM, at its annual conference at Dunoon last week. The expenses of such re-organisation, he suggested, should be obtained by the Chancellor of the Exchequer by imposing a special tax on the people drawing large profits from the industry. Mr. Pearson also called for an investigation into the distribution of industrial and domestic coal.

Parliamentary Topics

MR. MARPLES asked the Minister of Supply whether he would appoint a working party to inquire into the iron and steel industry and await their report before making any decision on the future of the industry. Mr. G. Strauss: No, Sir. Mr. Marples: In view of the record-breaking achievements of the industry, is it desirable to disturb the rhythm of production by nationalisation or the threat of nationalisation and will the Minister undertake not to nationalise it until an impartial independent technical body, devoid of politicians, has pronounced in favour of that course? Mr. Strauss: No, Sir, we have all the information that we require.

Industrial Productivity Working Groups.—Asked whether he would publish a list of the working groups under the Panels of Industrial Production, their chairman and members, Mr. Herbert Morrison said that although particular tasks were entrusted to such groups from time to time, responsibility for advice rested with the panels, and he was therefore not prepared to furnish further particulars.

Light Oils Duty.—Amendments to the Finance (No. 2) Bill, tabled in committee by Mr. F. J. Errol, and seeking rebate of 9d. per gal. on light hydrocarbon oils used in industry, agriculture, and civil aviation, were resisted by Mr. Glenvil Hall for the Government, and rejected by 238 votes to 116. Explaining the Government's attitude to use in industry, Mr. Hall said the deputation recently received at the Treasury put forward what appeared to be a very strong case. But on consideration, the Chancellor had come to the conclusion that the burden of this tax on industry was not very great. So far as exports are concerned, the manufacturer could obtain a refund to make up what had been spent on the tax on the oil that entered into them. Seed crushers and dry cleaners could recover most of the oil they used; it could be used over and over again.

Bacteriological Warfare.—Asked what investigations the Ministry of Defence was conducting into bacteriological warfare, Mr. A. V. Alexander said the possibility of this form of warfare in a future conflict was not being overlooked, and research work was proceeding. He declined to go into the matter in more detail.

Streptomycin for Hospitals.—Replying to a question relating to inadequacy of supplies of streptomycin in Scotland, Mr. A. Woodburn said that supplies are still very limited, but allocations to the five treatment centres in Scotland had recently been increased by almost 70 per cent.

Eleven Hydro-electric Projects.—At the end of May 1948, work was in progress on 11 hydro-electric projects prepared by the North of Scotland Hydro-Electric Board and 5500 men were employed. The proposed installed generating capacity of these projects will be 426,800 kW. and the estimated annual average output 832½ million units of electricity. Six projects have been submitted to me by the Board for confirmation, on four of which, if confirmed, they would propose to start this year.—Mr. A. Woodburn.

Chalk Excavation.—Questioned on the extent and adequacy of current chalk excavation operations, Mr. Charles Key said the rate was estimated at between 15 and 16 million tons a year. Chalk requirements were likely to increase, however, particularly for the manufacture of cement and lime. He did not think the areas at present under excavation would meet those needs.

NCB RESEARCH

SIR Charles Ellis, scientific member of the National Coal Board, speaking at Wigan last week on the place of science in technical training, said the research man was "a different type of scientist," and they could easily have too much of him. But it was their duty to investigate a seam and enable plans to be made. It was work that would give knowledge of the quantities of coals many years before they were mined. The research group of the NCB were working out new processes of breaking coal, stowing waste, or of preparing coal and up-grading it. They would study the chemicals obtainable from coal in addition to the development of new instruments for use in the mines. This would be pioneer work and could appropriately be labelled "research."

Tin Metal Allocations

The Ministry of Supply announces final allocations of tin metal by the Combined Tin Committee for the first half of 1948 have been made. The figures (total allocations for the first half of 1948 in parentheses) in long tons are as follows:

Austria, 35 (535); Brazil, 75 (1075); Canada, 270 (2175); Ceylon, 10 (49); Chile, nil (32); Czechoslovakia, 40 (626); Denmark, 40 (320); Egypt, 20 (184); Finland, 15 (120); France, 680 (5440); Germany (U.S./U.K. zone), 80 (644); Germany (French zone), nil (120); Greece, nil (70); Hong Kong, 25 (200); India, 350 (2800); Ireland, 10 (30); Mexico, nil (80); New Zealand, 35 (291); Norway, 20 (160); Pakistan, 35 (330); Palestine, nil (55); Poland, 130 (1000); Roumania, 20 (100); South Africa, 10 (350); Sweden, 100 (800); Switzerland, 50 (385); Turkey, 35 (480); U.S.A., 2,550 (20,400); Uruguay, 10 (45); Yugoslavia, 40 (270); others, 30 (220). Total for the six months, 39,486.

Home News Items

Dunlop Donation.—The Dunlop Rubber Co. has sent £1000 to the Lord Mayor of London in response to his appeal for the United Nations Fund for Children.

Foreign Postal Facilities.—The Post Office announces that a telephone service with Tangier is now available between 8 a.m. and 10 p.m. daily. The minimum charge for a three minutes' call is £1 10s. The cash on delivery service—maximum £30—for mails to India, French India and Tibet has also been resumed.

Fertiliser Prices.—The Board of Trade has made the Fertiliser (Prices) (Amendment) Order, 1948, with effect from June 1, which (a) increases by 1s. 6d. per ton the delivered prices of sulphate of ammonia in lots of less than six but not less than four tons and (b) allows sulphate of potash produced in this country to be sold at the same delivered price as imported sulphate of potash.

Scottish Textile Dyeing Machinery.—Scottish manufacturers of textile dyeing and finishing plant have sufficient orders on their books to keep them fully occupied for the next four years. A noteworthy development is the production of a fully automatic finishing unit which incorporates a U.S. type predryer, a compensator, and a pinstenter, all automatically controlled by instruments—mounted on an adjacent board.

Penicillin Ointment Warning.—A reminder to pharmacists that a prescription, signed and dated by a registered veterinary surgeon, is essential before penicillin ointment can be supplied to farmers has been issued by the Pharmaceutical Society. In some places farmers are reported to have objected to paying the veterinary surgeon's fees to secure a prescription and to have prevailed upon pharmacists to contravene the Penicillin Act 1947.

Good Market Prospects in Sweden.—A substantial volume of business is available in Scandinavia for Scottish firms prepared to offer reasonable delivery and to make personal contacts, Mr. Gordon Jackson, managing director of the Engineering Centre, Ltd., Glasgow, told Scottish manufacturers on his return from Sweden. Goods must be reasonable in price and of a design and quality suitable to the market concerned. Indication of the interest displayed by overseas buyers in Scottish products was the fact that in recent months inquiries had been received from most of the European countries, India, Canada, Brazil and the Argentine.

A Floating Laboratory.—So that British scientists can undertake biological research in the Arctic fishing grounds, a specially designed ship containing a fully equipped laboratory with modern temperature recording devices, has recently been built at Selby for the Ministry of Agriculture and Fisheries.

Coal Output Down.—Coal output last week totalled 4,212,700 tons, production from deep mines amounting to 3,973,200 tons. This is a decrease of 54,400 tons on the previous week. The minimum target of 4 million tons of deep-mined coal has been reached only thrice this year.

New Glass Equipment.—At a recent exhibition of glass products held in Glasgow, Pilkington Brothers, Ltd., of St. Helens displayed a new type of "toughened" glass tank suitable for use in the chemical, dyeing or canning industries. The framework of the vat is stainless steel and it is claimed that the new equipment permits continuous visual observation of materials during processing.

Better Cement Supplies.—Builders will receive sufficient cement to fulfil all their requirements this summer, according to Mr. F. M. Sleeman, president of the National Federation of Building Trades Employers speaking at Southend last week. He said the Minister of Works had assured him that exports of cement would be reduced to make this possible.

Purchase Tax Reductions.—The Chancellor of the Exchequer has given notice that he proposes on Report of the Finance Bill to move amendments which will effect reductions in purchase tax chargeable on a number of domestic and other goods, including a reduction to 66⅔ per cent. in the rate of tax on gas-operated space heating and water heating appliances. Appliances operated from the electric mains remain chargeable with tax at 100 per cent.

Groundnut Scheme Costs.—After his tour of the East African groundnut zone, Mr. Strachey, at Nairobi, on June 10, said the scheme may cost up to £50 million (as against the White Paper estimate of about £25½ million) owing to big increases in the price of all requirements. Oils were now selling at £55-70 per ton, however, whereas it had been estimated that they would fetch only about £30 per ton. He had prepared a rough estimate of the cost of production if the capital outlay were doubled, and found it made a difference of only about £1 a ton.

Continued Expansion in Canada

Aluminium Research and Dyestuffs Development

OFFICIALS of Aluminium Laboratories, Ltd., a subsidiary of Aluminium, Ltd., announced last week that plans had been drawn up for the erection of a large research laboratory at Arvida, Quebec, to investigate aluminium production problems. The new laboratory, which will incorporate a pilot production plant, is expected to be completed in 1949 at an estimated cost of $1 million. Research on aluminium has been in progress at Arvida for a considerable time, and the city is considered a natural choice for the location of laboratory facilities, since it is the site of the large aluminium production plant operated by Aluminium Company of Canada, Limited, the principal users of the results of the research. Investigations will be concentrated upon problems arising from the actual production of light metals, including the extraction of metallic aluminium and magnesium, the chemical treatment of basic ores and other raw materials and electrochemical and electro-thermal reduction of the metals from their oxides.

Virile Textile Trade

Increased activity is reflected in another important branch of Canadian chemical industry. Firms engaged in the dyeing and finishing of textile goods are working at full pressure and during 1946—the latest complete year for which statistics are available—the gross value of the work performed by the 41 establishments engaged in this trade totalled over $9 million, an increase of nearly $1 million on the previous year. Reporting this, the Dominion Bureau of Statistics states that 61 per cent of the total relates to the dyeing and finishing of textile fabrics and the remainder is derived from the finishing of yarns, rubberising, printing and bleaching.

Another Canadian firm, Eaton Chemical & Dyestuff Company, also announces the construction of new plant at Toronto. The building, occupying an area of 24,000 sq. ft., is expected to be ready early next year and transport facilities include a private railway siding.

$110 Million for Chemicals

Production by Canada's chemical industries grew from a value of $28 million in 1920 to $110 million in 1945, according to Mr. S. Picard, Canadian delegate to a Paris meeting of the new Chemical Industries Commission of the International Labour Organisation. Output could now meet about 75 per cent of domestic demand, and the value of chemical industry establishments in Canada was about $120 million; 10,000 persons were employed.

INDIA'S NEW DEPARTMENT OF SCIENTIFIC RESEARCH

THE Goverinment of India has created a Department of Scientific Research with effect from June 1. The department will be in the charge of the Prime Minister of India and Dr. S. S. Bhatnagar, F.R.S., Director of Scientific and Industrial Research, has been appointed the Secretary and Principal Executive Officer. The department will take over the work of the Board of Research on Atomic Energy and the Council of Scientific and Industrial Research. The latter body, although attached to the department, will retain its unofficial character and will continue to function as before.

The DSR will deal also with scientific advice in government departments, *ad hoc* scientific research in universities and research institutions, research scholarships in applied scientific subjects, international scientific unions, scientific liaison offices, the Scientific Consultative Committee and such other subjects as may be transferred to it. It will co-ordinate the scientific activities of the other Ministries and in this work it will be assisted by a Co-ordination Committee consisting of eminent scientists.

Electronics Exhibition

The third annual Electronics Exhibition organised by the North-West Section of the Institution of Electronics will be held at the College of Technology, Manchester, during the three days July 20, 2.30 p.m. to 9 p.m.; July 21, 10 a.m. to 9 p.m.; July 22, 10 a.m. to 9 p.m. There will also be an exhibition of scientific films arranged by the Manchester Scientific Film Society. Admission to the exhibition will be by tickets to be obtained from Dr. J. A. Darbyshire, "Melandra," 1 Kershaw Road, Failsworth, Manchester.

Overseas News Items

Oil Refinery for Belgium.—An oil refinery to be constructed near Antwerp will have an annual output of 1.3 million barrels of crude oil. The work may be completed in three years.

U.S. Stainless Steel Production Up.—Stainless steel production in the U.S.A. has increased from 42,000 tons in 1929 to over 500,000 tons last year, according to a steel industry exhibit in New York, sponsored by the American Iron and Steel Institute.

Argentine Sunflower-seed Crop.—Argentina's present season's crop of sunflower-seed promises to be the largest ever recorded, the first official estimate being 1073 million metric tons compared with 688,500 tons harvest last season.

New Spanish Glassworks.—At a total cost of 100 million pesetas, a new glassworks occupying an approximate area of 40,000 sq. metres is being erected at Aviles in Asturia. The site is well served by road, rail and sea.

Argentine State Tin Smelter.—The Argentine Defence Ministry is to build a tin smelter near Tucuman, between the Bolivian border and Buenos Aires. Fabricaciones Militares (Military Manufacturers), authorised contractors, already operates several mines and metallurgical laboratories. It is also responsible for the uranium deposits said to exist in the Buenos Aires district and elsewhere.

Oil Refining in Germany.—The *Petroleum Press Service* reports that as a result of a recent agreement between the German Shell, A.G., and the Union Rheinische Braunkohlen Kraftstoff, A.G., owners of the Wesseling hydrogenation plant near Cologne, a large part of Germany's imported crude oil is to be refined in this plant which has a capacity of 750,000 tons per annum. The hydrogenation plant at Gelsenkirchen-Buer is also to be re-opened.

No ERP Trade for Argentina.—The U.S. Economic Co-operation Administration will not finance any European purchases in Argentina "for some little time," according to Mr. Richard Bissell, Assistant Deputy ECA Administrator. Mr. Bissell gave two reasons: The possibility of reduced ECA appropriations and the fact that U.S. crop prospects have improved since the original ECA programme estimates and therefore, the urgency of financing purchases in Argentina had lessened. He added that ECA "definitely is not sending anyone to Argentina to undertake negotiations in the near future."

Industrial Science Plan for Argentina.—The Argentine Government is to establish a University for industrial science—Universidad Obrera National—at an estimated cost of 30 million pesos.

Argentina to Produce Tartaric Acid.—A tartaric acid plant at present under construction in Mendoza, the chief wine-producing district of Argentina, is soon to start operations. It is reported that output will render imports unnecessary.

Netherlands' Oil and Coal Commission.—A special commission, under the chairmanship of Professor J. Goudriaan, has been appointed by the Netherlands Ministry of Economic Affairs to study and report upon coal and petroleum resources.

Luxemburg Iron and Steel.—Luxemburg, where 21 out of a total of 32 blast furnaces are operating, produced in April 210,625 tons of pig-iron (208,843 in March and 151,513 tons monthly average during 1947). Steel production rose from 194,603 to 200,811 tons in the same period.

Chemical Progress in Russia.—Russian progress in the development of synthetic oil, resins and plastics, is slow, says a writer in the *New York Journal of Commerce*. He alleges that the major aims of Russian chemical research are to meet immediate chemical requirements. Their synthetic petroleum industry is described as "sporadic and still disorganised."

Dutch Oil Output.—Since the beginning of the year, crude oil output in the Schoonebeek oilfield in North Eastern Holland has nearly doubled reports the *Petroleum Press Service*. Production is now at the rate of about 400,000 tons a year, and further drilling is expected to add to the present 46 wells. High wax content, however, has caused frequent closing of wells for pipe clearance. Refining at the Bataafsche Petroleum Company's plant at Pernis is expected soon to reach an annual output of 3 million tons.

U.S. Die-casting Machine.—A small type of die-casting machine, incorporating a number of new engineering features is announced by the DCMT Corporation, New York. Designed for quick, economical casting of small parts in zinc alloy it utilises low-cost single-cavity dies operating at high speed. Features include hand and foot controls and a new air system with integral pilot and ram valves. The machine carriage is undercut for downpulls and ejecting large castings, and the base plate adjustable to allow the use of die blocks of any thickness.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

D. W. PRICE & SON, LTD. London, N.W., glass manufacturers. (M.19/6/49). May 11, charge, to Barclays Bank Ltd., securing all moneys due or to become due to the Bank; charged on Braemar Works, Neasden Lane, Willesden.

BATANG CONSOLIDATED RUBBER ESTATES, LTD., London, E.C. (M.19/6/48). May 13, loan agreement securing to Industrial Rehabilitation Finance Board, Kuala Lumpur, Malaya, all sums which the chargees may be called upon to pay under or by reason of a certain guarantee; charged on certain lands in Malaya. *Nil. December 2, 1947.

ABACO (SELANGOR) RUBBER, LTD., London, E.C. (M.19/6/47). May 7, charge and loan agreement securing to Industrial Rehabilitation Finance Board, Kuala Lumpur, Malaya, all sums which the chargees may be called upon to pay under or by reason of a certain guarantee; charged on certain land in Selangor. *—. April 20, 1948.

EOW SENG RUBBER CO., LTD., London, E.C. (M.19/6/48). May 20, two charges, to Industrial Rehabilitation Finance Board, Malaya Union Government, securing 60,000 Straits Dollars or sums which the chargees may be called upon to pay under or by reason of a guarntee; charged on lands in Mukim of Parit Buntar, district of Krian, Perak. *Nil. May 10, 1946.

Satisfaction

HARBENS, LTD. (formerly HARBEN'S (VISCOSE SILK MANUFACTURERS), LTD. & HARBENS, LTD.), Golborne. (MS.19/6/48). Satisfaction May 14, £150,000. registered May 3, 1934.

Company News

The nominal capital of **Buffle, Ltd.**, Regent House, 89 Kingsway, London, W.C.2, has been increased beyond the registered capital of £500 by £500, in £1 ordinary shares.

British Alkaloids, Ltd., announces a final dividend of 27.8 per cent (less tax) on the 8 per cent participating preference shares (making 44 per cent), and 55 per cent (less tax) on the ordinary shares, making 80 per cent for the year.

Courtaulds, Ltd., reports a net profit of £1,298,326 for the year ended March 31, as compared with £2,083,830 for the previous 15 months. A final payment of 5 per cent makes 7½ per cent for the year. In the previous 15 month period, dividends totalled 9¼ per cent. Of the present gross earnings of £4,581,723 some £2,946,000 was set aside for taxation.

The Zinc Corporation reports an 80 per cent increase in its gross sales in 1947 at £4,847,913, an increase of £2,172,566. Charges for mining, smelting, development etc., reduced the balance to £1,633,690, but this represents an increase of well over 100 per cent. The disposable total is £1,665,279, against £826,752 in the previous year.

New Companies Registered

Harvey Photochemicals, Ltd. (455,123).—Private company. Capital £1000. Manufacturing, research and analytical chemists, etc. Reg. office: 20 West Hall Road, Kew Gardens, Surrey.

Pharmodrug, Ltd. (455,091).—Private company. Capital £1000. Chemical manufacturers, etc. Directors: A. Eldon, W. A. Evill, and G. Munz. Reg. office: 57 Carter Lane, E.C.

Executive Perfumers, Ltd. (455,003).—Private company. Capital £100. Soap manufacturers, manufacturers, refiners and preparers of all kinds of oils, oleaginous and sapaceous substances, pharmaceutical, manufacturing and general chemists, etc. Directors: M. Labovitch, N. Labovitch and J. E. Goodman. Reg. office: 15 Bond Street, Leeds.

Chemical and Allied Stocks and Shares

STOCK markets have shown caution as prices tended to recede in the absence of demand. Earlier gains in British Funds were not fully held, a batch of disappointing results had some repercussions on industrial shares, and elsewhere the Burmese Prime Minister's "follow Russia" speech depressed Far Eastern securities.

Chemical and kindred shares displayed a number of firm features, with Imperial Chemical moving narrowly around 47s. 6d. awaiting the new issue terms. Dunlop Rub-

ber were 70s. 3d., British Oxygen 99s. 4½d., and Turner & Newall 75s. Monsanto Chemical were 59s. 4½d., Amber Chemical 2s. shares 9s. 6d. Albright & Wilson 5s. shares changed hands around 30s. 3d., and Fisons were 57s. 9d. In other directions, Laporte Chemicals 5s. ordinary changed hands slightly over 20s., and W. J. Bush new 5½ per cent preference were 26s. 10½d. Business around 26s. 6d. took place in Burt, Boulton & Haywood.

Shares of companies with interests in plastics reflected the general market trend, British Xylonite being £5½, with British Industrial Plastics 2s. ordinary 7s., De La Rue 45s., and Erinoid 5s. shares 14s. 3d. Elsewhere, United Molasses came back to 48s. 9d., British Plaster Board were 25s., and various other building shares strengthened on hopes that some of the industry's controls may be relaxed. Associated Cement failed to hold their best level, but at 72s. 3d. were better on balance. Units of the Distillers Co. have been steady at 27s., and elsewhere, Triplex Glass strengthened to 25s. 9d. aided by the belief that profits are running at a higher level, although dividend limitation will keep the distribution at last year's rate. At 48s. 9d. British Aluminium eased, and Lever & Unilever were 49s. 3d. British Glues & Chemicals 4s. ordinary shares have been steadier at 20s. 7½d. with the participating preference shares 46s. 3d.

In other directions, British Drug Houses 5s. shares were 8s. 6d. Beechams deferred have eased to 18s. 9d., with Sangers at 34s., and Griffiths Hughes 34s. 6d. Boots Drug showed little movement at 51s. 3d. Borax Consolidated at 61s. 3d. have been steady, the assumption in the market being that the company's earnings are probably being maintained in view of its interests in the United States.

Tube Investments at £6 were slightly lower on balance, movements in iron, steel and kindred shares generally being small and indefinite in trend. United Steel were 28s. 7½d., with Colvilles 34s. 3d., and Stewarts & Lloyds 54s. 9d. Pease & Partners strengthened to 19s. 9d. on the chairman's hint of prospects of a return of capital. Ruston & Hornsby at 60s. 6d. were another good feature in view of the record profits for the past year, and the new capital decision which is likely to take the form of an offer of new shares to shareholders.

Courtaulds at 39s. were dull and slightly lower, although the 7½ per cent dividend for the past year is at the same rate as the payment for the previous period of 15 months. The preliminary statement emphasises the extent to which taxes bear on the company, and as far as net earnings are concerned this has more than offset the benefits arising from increased production. British Celanese (20s. 6d.) were lower; the market assumes that more capital may be raised later in the year. In other directions, General Refractories at 23s. 1½d. have been steady. Oil shares were subject to cross-currents, and have moved lower on balance. Burmah Oil fell to 66s. 3d. although it is realised that the company has big investments in Shell and Anglo-Iranian apart from its properties in Burma.

British Chemical Prices

Market Reports

UNCHANGED conditions have been reported throughout the industrial chemicals market during the past week, and from the point of view of new bookings the demand has been satisfactory, with overseas business fully maintained. The call for the soda compounds is strong relative to the supplies available, and as yet there is little indication of any early improvement in output. There is nothing to report on the potash chemicals, which remain scarce. Hydrogen peroxide, arsenic, formaldehyde, and acetone are active among the miscellaneous products, and a steady demand is reported for the lead oxide. Trade in the coal-tar products has been brisk with a good export demand for pitch, creosote, and cresylic acid.

MANCHESTER.—Trade in the general run of heavy chemical products on the Manchester market has proceeded on steady lines during the week. Home trade industrial consumers are pressing for deliveries of textile and other chemicals, and sellers report that replacement business is coming forward satisfactorily. Inquiries on overseas account are in the market from shippers and export business generally, and they cover a wide range of products. This trade seems to be well maintained. After the recent slight price reductions the undertone of the market is steady. Trading conditions in respect of fertilisers are seasonally quieter, but a steady demand for most of the tar products continues to be reported.

GLASGOW.—In the Scottish chemical market business during the week has once again been on a reduced scale. The more hopeful outlook which had prevailed in the previous two or three weeks has not continued. The demand from regular users of inorganic chemicals has been fairly steady, but the demand for other materials has been less reliable. In the export market, however, conditions have been better and a substantial number of orders have been booked. There have been no noteworthy changes in prices.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Preparation of N_1-di-substituted melamines.—American Cyanamid Co. Sept. 14, 1944. 601,539.

Process for the production of plasticised rubber-like polymers.—Standard Oil Development Co. and J. C. Arnold. Sept. 27, 1945. (Addition to 590,192.) 601,479.

Manufacture of substituted ω-(benzenesulphonyl)-acetophenones.—Roche Products, Ltd., F. Bergel, A. L. Morrison, A. R. Moss and H. Rinderknecht. Oct. 1, 1945. 601,329.

Deposited neoprene latex articles.—International Latex Processes, Ltd. Oct. 11, 1944. 601,336.

Fluid-fuel burning means.—Babcock & Wilcox, Ltd. Oct. 11, 1944. 601,406.

Manufacture of threads and similar articles from polyvinyl compounds.—Soc. Rhodiaceta. March 10, 1943. 601,413.

Processes for the preparation of substances rich in enzymes and the products obtained thereby.—E. Alilaire. Oct. 27, 1944. 601,417.

Synthetic lubricant compositions.—Carbide & Carbon Chemicals Corporation. Dec. 13, 1944. 601,419.

Preparation of colloidal sulphur.—F. F. Schwartz. Oct. 4, 1944. 601,497.

Method of dehydrogenating mono-olefin and alkylated aromatic hydrocarbons.—C. Arnold (Standard Oil Development Co.). Oct. 3, 1945. 601,544.

Process for producing fast dyeings.—Ciba, Ltd. Oct. 6, 1944. (Cognate Application 25968/45.) 601,347.

Acid-resistant containers made from synthetic-resin mouldable compositions.—W. W. Constantine (General Motors Corporation). Oct. 17, 1945. 601,506.

Liquid hydrocarbon compositions.—British Thomson-Houston Co., Ltd. Nov. 15, 1944. 601,359.

Bleaching of cellulose.—Hercules Powder Co. April 13, 1945. 601,643.

Bleaching of cellulose fibres.—Solvay & Cie. Dec. 15, 1944. 601,645.

Production of chloronitriles.—E. I. Du Pont de Nemours & Co. and O. W. Cass. Dec. 5, 1945. 601,510.

Production of chloronitriles.—E. I. Du Pont de Nemours & Co., O. W. Cass and H. B. Copelin. Dec. 5, 1945. 601,511.

Polymers of vinyl compounds and their preparation.—British Thomson-Houston Co., Ltd. Dec. 11, 1944. 601,568.

Potassium soap.—M. J. H. E. Hustinx. Dec. 12, 1940. 601,651.

Process for the production of metallisable azo dyestuffs and complex metal compounds thereof.—J. J. V. Armstrong (J. R. Geigy, Akt.-Ges.). Jan. 21, 1946. 601,369.

Means for priming centrifugal pumps for liquid.—Bernard-Moteurs. Jan. 27, 1939. 601,653.

Process for the continuous treatment of solids and gases.—Standard Oil Development Co. Oct. 28, 1941. 601,723.

Production and manufacture of resinous products from phenolic oils.—Low Temperature Carbonisation, Ltd., G. S. Pound, and S. R. M. Ellis. July 1, 1943. 601,904.

Production of synthetic bitumens.—Low Temperature Carbonisation, Ltd., G. S. Pound, and S. R. M. Ellis. July 1, 1943. 601,905.

Extruded aluminium base alloys.—T. F. Bradbury, and H. G. Warrington. Jan. 6, 1944. 601,813.

Manufacture of insecticidal preparations.—Murphy Chemical Co., Ltd., and V. H. Chambers. Sept. 22, 1944. 601,666.

Catalytic conversion of hydrocarbons.—J. C. Arnold. (Standard Oil Development Co.) March 20, 195. 601,679.

Liquid phase chemical reactions.—British Resin Products, Ltd., and W. G. Daroux. April 5, 1945. 601,684.

Synthesis of ethylated aromatic hydrocarbons.—Koppers Co., Inc. Feb. 13, 1943. 601,692.

Cellulose derivatives and their process of preparation. Comptoir des Textiles Artificiels, S.A.R.L. May 25, 1943. 602,699.

Process for the production of artificial filaments, fibres and films of low swelling characteristics.—Comptoir des Textiles Artificiels, S.A.B.L. May 25, 1943. 601,694.

Process for modifying the physical characteristics of cellulosic artificial threads.—Comptoir des Textiles Artificiels, S.A.R.L. May 25, 1943. 601,696.

Refining of cyanogen chloride.—A. H. Stevens. (American Cyanamid Co.) Aug. 2, 1945. 601,701.

Process for catalytic isomerisation of paraffins and preparation of catalysts therefor.—J. C. Arnold. (Standard Oil Development Co.). Aug. 2, 1945. 601,702.

Methods for production of sulphanilic acid amide compounds.—A. Benzon A/B. May 2, 1942. 601,709.

Production of protective coatings on aluminium or aluminium-alloy surfaces.—J. F. Buckman, and W. R. Mayer (trading as Enthone Co.). Sept. 14, 1944. 601,736.

Process for making an alkali metal salt of an amino carboxylic acid.—L. N. Reddie. (Carbide & Carbon Chemicals Corporation.) Sept. 19, 1945. 601,816.

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Process for making salts of carboxylic acids.—L. N. Reddie. (Carbide & Carbon Chemicals Corporation.) Sept. 19, 1945. 601,817.

Manufacture of a synthetic resin.—F. M. Cargill. Oct. 3, 1945. 601,819.

Process for the electroplating of aluminium.—K. T. Suchy. Oct. 4, 1945. 601,825.

Ceramic materials.—Western Electric Co., Inc. Oct. 10, 1944. 601,847.

Safety control and ignition systems for gaseous fuel burners.—L. S. E. Ellis. (Robertshaw Thermostat Co.) Oct. 5, 1945. 601,739.

Methods of preparing zirconium oxide.—C. E. Every. (Titanium Alloy Manufacturing Co.) Oct. 9, 1945 601,876.

Production of crude 4, 4'-dichlorodiphenyl trichloroethane.—I.C.I., Ltd. Oct. 10, 1945. 601,886.

Cellulose ester products.—British Celanese, Ltd. Oct. 12, 1944. 601,896.

Process for the preparation of sulphonic derivatives of guanidine.—Soc. des Usines Chimiques Rhone-Poulenc. June 10, 1941. 601,746.

Treatment of alloy steel articles.—Guy Motors, Ltd., and W. E. Woodward. Oct. 11, 1945. 601,755.

Compositions from vinylidene chloride copolymers.—Wingfoot Corporation. July 12, 1945. 601,762.

Synthetic rubber.—Wingfoot Corporation. July 19, 1945. 601,763.

Process for the manufacture of derivatives of acridine.—Ward, Blenkinsop & Co., Ltd., Howards & Sons, Ltd., A. A. Goldberg, W. Kelly, and H. S. Turner. Oct. 11, 1945. 601,768.

Preparation of methyl vinyl ketone—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Oct. 15, 1945. 601,922.

Manufacture of 2-ethyl-*n*-hexanol and alpha-ethyl caproic acid, the esters thereof and plasticised compositions containing said esters.—Distillers Co., Ltd., B. Duval, and K. H. W. Tuerck. Oct. 26, 1945. 601,900.

Manufacture of ethyl caproic acid, esters thereof and compositions containing said esters.—Distillers Co., Ltd., B. Duval, and K. H. W. Tuerck. Oct. 26, 1945. 601,901.

Process for producing ascorbic acid from derivatives of l-keto-2 gulonic acid.—Nederlandsche Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek. Aug. 4, 1943. 601,789.

Manufacture of basic calcium chlorate.—Solvay & Cie. Dec. 5, 1944. 601,928.

Production of partially chlorinated derivatives of rubber and the like.—Rubber-Stitching. July 29, 19. 601,932.

Preparation of silico-organic compounds.—B. Gluck, C. Shaw, and W. E. Smith. Dec. 7, 1945. 601,938.

Preparation of acetyl-butyrolactone.—U.S. Industrial Chemicals, Inc. Feb. 17, 1945. 601,802.

Manufacture of vinyl esters and polymers and interpolymers derived therefrom.—I.C.I., Ltd., Dec. 9, 1944. 601,807.

Coating of sheet materials.—I.C.I., Ltd., and W. E. F. Gates. March 15, 1946. 601,713.

Coating of sheet materials.—I.C.I., Ltd., and W. E. F. Gates. May 17, 1946. 601,715

Production of synthetic resin-fatty oil compositions.—British Resin Products Ltd., L. R. Anthony, J. D. Morgan, and B. Frenkel. Dec. 23, 1943. 602,166.

Preparation of titanium dioxide.—Pittsburgh Plate Glass Co. April 4, 1941. 602,094.

Production of pseudoxazolone derivatives and reduction products thereof.—F. E. King, S. G. Waley, and R. Robinson. June 7, 1944. 602,025.

Refining of hydrocarbons.—Anglo-Iranian Oil Co., Ltd., and L. C. Strang. Aug. 18, 1944. 602,097.

Manufacture of organic mercaptans and sulphides.—J. C. Arnold. (Standard Oil Development Co.) Oct. 10, 1944. 602,238.

Lubricants, waxes and other hydrocarbon or substituted hydrocarbon products.—J. C. Arnold. (Standard Oil Development Co.) Oct. 12, 1944. 602,239.

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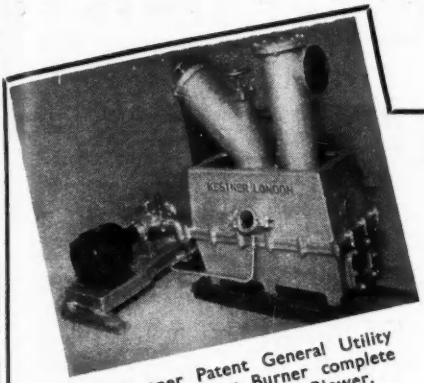

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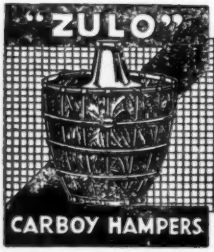

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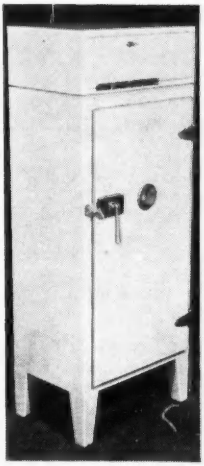
DESICCATOR STORAGE CABINET



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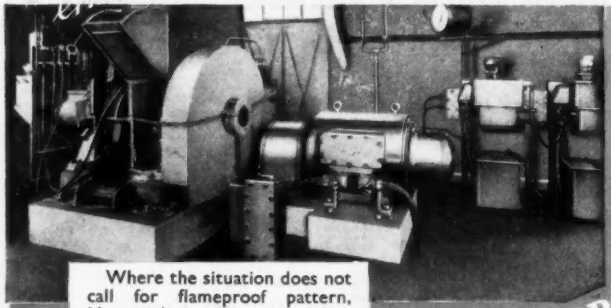
MOTORS *for* PAINT PRODUCTION



Left: A Metrovick 40 hp. flameproof motor driving Banbury mixer at a large paint works in the Midlands. The control gear is also of the Metrovick flameproof pattern.

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